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August 1992

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# The Protection of Corn, September 1988 - May 1992

Citations from AGRICOLA  
Concerning Diseases and Other  
Environmental Considerations



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Citations from AGRICOLA  
Concerning Diseases and Other  
Environmental Considerations

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## **FOREWORD**

This is the 44th volume in a series of commodity-oriented environmental bibliographies resulting from a memorandum of understanding between the U.S. Department of Agriculture, National Agricultural Library (USDA-NAL), and the U.S. Environmental Protection Agency, Office of Pesticide Programs (EPA-OPP).

This close working relationship between the two agencies will produce a series of bibliographies which will be useful to EPA in the regulation of pesticides, as well as to any researcher in the field of plant or commodity protection. The broad scope of information contained in this series will benefit USDA, EPA, and the agricultural community as a whole.

The sources referenced in these bibliographies include the majority of the latest available information from U.S. publications involving commodity protection throughout the growing and processing stages for each agricultural commodity.

We welcome the opportunity to join this cooperative effort between USDA and EPA in support of the national agricultural community.

JOSEPH H. HOWARD, Director  
National Agricultural Library

DOUGLAS D. CAMPT, Director  
Office of Pesticide Programs



## INTRODUCTION

The citations in this bibliography, The Protection of Corn, September 1988 - May 1992, are selected from the AGRICOLA database and cover diseases, insects, nematodes, weeds, chemicals, and other environmental considerations. BLA 36, The Protection of Corn, 1979 - November 1984, and BLA 69, The Protection of Corn, December 1984 - August 1988, completed the coverage of this crop to this date.

This is the 44th volume in a series of commodity-oriented listings of citations from AGRICOLA jointly sponsored by the U.S. Department of Agriculture, National Agricultural Library (USDA-NAL), and the U.S. Environmental Protection Agency, Office of Pesticide Programs (EPA-OPP). During the past year, subjects in this series included The Protection of Stored Grains; The Protection of Nut Crops; The Protection of Peanuts; The Protection of Tomatoes, Egg Plants, and Peppers; and The Protection of Lawn and Turf Grasses. Other titles to be issued during the current year are The Protection of Pome Fruits, Biotechnology in Agriculture, and Methylbromide and Its Alternatives As Fumigants.

Entries in the bibliography are subdivided into a series of section headings used in the contents of the Bibliography of Agriculture. Each item appears under every section heading assigned to the cited document. A personal author index and a site index to plants are included with each volume.

The U.S. Environmental Protection Agency contact for this project is Richard B. Peacock, Office of Pesticides and Toxic Substances.

Any comments or questions concerning this bibliography may be addressed to the compiler and editor:

Reference and User  
Services Branch  
USDA-NAL, Room 1402  
Beltsville, MD 20705  
(301) 504-6875

### Errata

47, 236, 244, 351, 372, 396, 436, 848, 857, 892, 922, 1062, 1236, 1573, 1575,  
1577, 1578, 1579, 1581, 1598



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0043

### Joint risk preference-technology estimation with a primal system.

Love, H.A. Buccola, S.T. Ames, Iowa : American Agricultural Economics Association. Applied studies of the firm in a risky environment have concentrated either on the firm's technology or on its risk preferences. These models result in generally inconsistent and inefficient parameter estimates. A primal model is proposed which allows a firm's preferences and technology to be estimated jointly in the presence of risk. The model is applied to Iowa corn production and estimated technology parameters are compared with those from other approaches. Modest risk aversion leads to inelastic (even backbending) per-acre supplies and input demands. Yield heteroskedasticity in inputs leads to supply heteroskedasticity in prices, especially for risk-neutral firms. American journal of agricultural economics. Aug 1991. v. 73 (3). p. 765-774. Includes references. (NAL Call No.: DNAL 280.8 J822).

0044

### Low-input practices.

Daberkow, S. Hansen, L.; Vroomen, H. Washington, D.C. : The Service. Agricultural outlook AO - U.S. Department of Agriculture, Economic Research Service. Dec 1988. (148). p. 23-25. ill. (NAL Call No.: DNAL aHD1751.A42).

0045

### Optimal fertilizer nitrogen and residual nitrate-nitrogen levels for irrigated corn and effects of nitrogen limitations: an economic analysis.

JPRAEN. Stoecker, A.L. Onken, A.B. Madison, Wis. : American Society of Agronomy. Journal of production agriculture. Oct/Dec 1989. v. 2 (4). p. 309-317. Includes references. (NAL Call No.:

0046

### The potential economic impact of herbicide-resistant corn in the USA.

JPRAEN. Tauer, L.W. Love, J. Madison, Wis. : American Society of Agronomy. Journal of production agriculture. July/Sept 1989. v. 2 (3). p. 202-207. Includes references. (NAL Call No.: DNAL S539.5.J68).

0047

### Probabilistic cost effectiveness in agricultural nonpoint pollution control.

McSweeney, W.T. Shortle, J.S. Experiment, Ga. : The Association. Conceptual weaknesses in the use of costs of average abatement as a measure of the cost effectiveness of agricultural nonpoint pollution control are examined. A probabilistic alternative is developed. The focus is on methods for evaluating whole-farm pollution control plans rather than individual practices. As a consequence, the analysis is presented in a chance-constrained activity analysis framework because activity analysis procedures are a practical and well developed device for screening farm plans. Reliability of control is shown to be as important as reduction targets in designing farm plans for pollution control. Furthermore, broad-axe prescriptions of technology in the form of Best Management Practices may perform poorly with respect to cost effectiveness. Southern journal of agricultural economics - Southern Agricultural Economics Association. July 1990. v. 22 (1). p. 95-104. Includes references. (NAL Call No.: DNAL HD101.S6).

0048

### Program participation and acreage response functions for U.S. corn: a regional econometric analysis.

Chembezi, D.M. Womack, A.W. East Lansing, Mich. : Michigan State University. Conventional methods in supply analysis have usually modeled program and non-program acreage response in a single aggregate equation. In the presence of government programs, such an approach is less preferred because it fails to distinguish the factors affecting producers' decisions to participate from the factors affecting their planting decisions. A more effective approach is to estimate producer participation response first and then relate this to program planted acreage. Nonprogram acreage response is estimated separately, and is inversely related to participant response. This article reports empirical estimates from two alternative procedures that directly address this concern. The analysis is based on regional time series data for the Cornbelt and Lake States and the Northern Plains. Review of agricultural economics. July 1991. v. 13 (2). p. 259-275. Includes references. (NAL Call No.: DNAL HD1773.A3N6).

(FARM ORGANIZATION AND MANAGEMENT)

0049

**Projected costs and returns -- cotton, soybeans, corn, milo and wheat, northeast Louisiana, 1990.**

Paxton, K.W. Lavergne, D.R. Baton Rouge, La. : The Station. A.E.A. information series - Louisiana Agricultural Experiment Station. Jan 1990. (78). p. A-1--A-66. (NAL Call No.: DNAL S67.E2).

0050

**Projected costs and returns--cotton, soybeans, corn, milo and wheat, northeast Louisiana, 1989.**

Paxton, K.W. Lavergne, D.R. Baton Rouge, La. : The Station. A.E.A. information series - Louisiana Agricultural Experiment Station. In the series analytic: Projected costs and returns and cash flows from major agricultural enterprises, Louisiana, 1989.~ Includes statistical data. Jan 1989. (70-76). p. A1-A62. (NAL Call No.: DNAL S67.E2).

0051

**Projected costs and returns--cotton, soybeans, corn, milo and wheat, Red River and Central Areas, Louisiana, 1990.**

Lavergne, D.R. Paxton, K.W. Baton Rouge, La. : The Station. A.E.A. information series - Louisiana Agricultural Experiment Station. Jan 1990. (79). p. B-1--B-40. (NAL Call No.: DNAL S67.E2).

0052

**Projected costs and returns--cotton, soybeans, corn, milo and wheat, Red River and Central Areas, Louisiana, 1989.**

Lavergne, D.R. Paxton, K.W. Baton Rouge, La. : The Station. A.E.A. information series - Louisiana Agricultural Experiment Station. In the series analytic: Projected costs and returns and cash flows from major agricultural enterprises, Louisiana, 1989.~ Includes statistical data. Jan 1989. (70-76). p. B1-B35. (NAL Call No.: DNAL S67.E2).

0053

**Projected costs and returns--soybeans, corn, milo, wheat, wheat-soybean double crop, and rice-crawfish double crop, Southwest Louisiana, 1990.**

McManus, B. Heagler, A. Baton Rouge, La. : The Station. A.E.A. information series - Louisiana Agricultural Experiment Station. Jan 1990. (80). p. C-1--C-81. (NAL Call No.: DNAL S67.E2).

0054

**Projected costs and returns--soybeans, corn, milo, wheat, wheat-soybean double crop, and rice-crawfish double crop, Southwest Louisiana, 1989.**

McManus, B. Zacharias, T. Baton Rouge, La. : The Station. A.E.A. information series - Louisiana Agricultural Experiment Station. In the series analytic: Projected costs and returns and cash flows from major agricultural enterprises, Louisiana, 1989.~ Includes statistical data. Jan 1989. (70-76). p. C1-C79. (NAL Call No.: DNAL S67.E2).

0055

**Projected costs and returns: cotton, soybeans, corn, milo and wheat, Northeast Louisiana, 1992.**

Paxton, K.W. Lavergne, D.R. Baton Rouge, La. : The Station. A.E.A. information series - Louisiana Agricultural Experiment Station. In the series analytic: Projected costs and returns and cash flows for major agricultural enterprises, Louisiana, 1992. Jan 1992. (99). p. A-1/A-72. (NAL Call No.: DNAL S67.E2).

0056

**Projected costs and returns: cotton, soybeans, corn, milo and wheat, Red River and Central Areas, Louisiana, 1992.**

Lavergne, D.R. Paxton, K.W. Baton Rouge, La. : The Station. A.E.A. information series - Louisiana Agricultural Experiment Station. In the series analytic: Projected costs and returns and cash flows for major agricultural enterprises, Louisiana, 1992. Jan 1992. (100). p. B-1/B-44. (NAL Call No.. DNAL S67.E2).

0057

**Projected costs and returns: rice, soybeans, corn, milo, wheat, wheat-soybean double crop, crawfish, rice-crawfish double crop--Louisiana, 1992.**

Giesler, G. Heagler, A.; Baldridge, T.; Huffman, D.; Dellenbarger, L. Baton Rouge, La. : The Station. A.E.A. information series - Louisiana Agricultural Experiment Station. In the series analytic: Projected costs and returns and cash flows for major agricultural enterprises, Louisiana, 1992. Jan 1992. (101). p. C-1/C-90. (NAL Call No.: DNAL S67.E2).

0058

**The projected financial condition of Illinois cash-grain farms, 1991-1994.**

Koenigstein, K.W. Lins, D.A. Urbana, Ill. : The Service. Farm economics facts and opinions - University of Illinois, Department of Agricultural Economics, Cooperative Extension Service. Jan 1991. (91-1). 9 p. (NAL Call No.: DNAL 281.8 F2226).

## (FARM ORGANIZATION AND MANAGEMENT)

0059

**Representative U.S. corn farms, 1987 /Michael E. Salassi, William D. McBride, Robert A. Pelly.**

Salassi, Michael E. McBride, William D.; Pelly, Robert A. Washington, D.C. : U.S. Dept. of Agriculture, Economic Research Service, 1991. Cover title. - "April 1991" -- P.i. iv, 60 p. : maps ; 28 cm. Includes bibliographical references. (NAL Call No.: DNAL 1 Ag84St no .820).

0060

**Risk and sustainable agriculture: a target-motad analysis of the 92-year "old rotation".**

Novak, J.L. Mitchell, C.C. Jr.; Crews, J.R. Experiment, Ga. : The Association. Target-MOTAD was used to assess the risks and returns of sustainable cotton crop rotations from Auburn University's 92-year "Old Rotation." Study results analyze rotations of continuous cotton, with and without winter legumes; two years of cotton-winter legumes-corn, with and without nitrogen fertilization; and three years of cotton-winter legumes-corn and rye-soybeans double-cropped. Ten years of observations on deviations from target income were used to identify optimal sustainable rotation(s). Study results suggest that diversification in rotations, as well as in crops, results in the least risk for a given level of target income. Southern journal of agricultural economics - Southern Agricultural Economics Association. July 1990. v. 22 (1). p. 145-153. Includes references. (NAL Call No.: DNAL HD101.S6).

0061

**Simulating physical processes and economic behavior in saline, irrigated agriculture: model development.**

WRERAO. Lefkoff, L.J. Gorelick, S.M. Washington, D.C. : American Geophysical Union. A model of an irrigated, saline stream-aquifer system is constructed to simulate economic, agronomic, and hydrologic processes. The model is applied to a section of the Arkansas Valley in southeastern Colorado and is used to examine the effect of crop-mixing strategies on long-term profits. Mixing in excess of crop rotation requirements provides an index of farmers' willingness to exchange some profit for a reduction in the risk of short-term loss. The model contains three components. The economic component simulates water use decisions that maximize annual profit for each farm. The hydrologic component simulates salt transport by employing regression equations that predict changes in groundwater salinity as a function of hydrologic conditions and water use decisions. The agronomic component approximates changes in corn and alfalfa production in response to the depth and salinity of irrigation applications. Results from the entire economic-hydrologic-agronomic model are consistent with the few historical observations available for the site. Water

resources research. July 1990. v. 26 (7). p. 1359-1369. maps. Includes references. (NAL Call No.: DNAL 292.8 W295).

0062

**Soil compaction, machinery selection, and optimum crop planning.**

TAAEA. Lavoie, G. Gunjal, K.; Raghavan, G.S.V. St. Joseph, Mich. : American Society of Agricultural Engineers. Previous studies on the economics of soil compaction have selected the optimum machinery complement on the basis of cost minimization. In this study the revenue side of the machinery is also considered. Linear programming models are developed to maximize net farm income considering the yield loss implications of different tractor sizes, farm sizes, and weather conditions. The results indicate that grain corn cultivated conventionally is the best system for the three weather patterns: wet, dry, and average. The optimum tractor size is 140 kW for a wet year and 60 kW for a dry year and 100 kW an average year. The impact and implications on the optimum net farm income of two other cultural practices, reduced tillage and crop rotation, are also analyzed in this study. Transactions of the ASAE. Jan/Feb 1991. v. 34 (1). p. 2-8. Includes references. (NAL Call No.: DNAL 290.9 AM32T).

0063

**Soil erosion, intertemporal profit, and the soil conservation decision.**

Pagoulatos, A. Debertin, D.L.; Sjarkowi, F. Experiment, Ga. : The Association. This study developed an intertemporal profit function to determine optimal conservation adoption strategies under alternative scenarios with respect to crop prices, relative yields, discount rates, and other assumptions. Special emphasis was placed on determining from the analysis when the switchover from conventional to soil-conserving practices should take place. Technological change was incorporated by allowing crop yields to vary over time. Our analysis thus provides a new, more precise measurement of the cumulative net benefit differential. The optimal period for switchover from conventional to soil-conserving practices was found to vary depending on the assumptions made about corn Prices and discount rates. Empirical results were based on an erosion damage function (EDF) for Western Kentucky corn production. Southern journal of agricultural economics - Southern Agricultural Economics Association. Dec 1989. v. 21 (2). p. 55-62. Includes references. (NAL Call No.: DNAL HD101.S6).

# (FARM ORGANIZATION AND MANAGEMENT)

0064

**Some thoughts on the potential economic impact of conservation compliance.**  
Wollenhaupt, N. Blase, M. Columbia, Mo. : Cooperative Extension Service, University of Missouri. Economic & policy information for Missouri agriculture - Department of Agricultural Economics, University of Missouri-Columbia. July 1989. v. 32 (7). 4 p. (NAL Call No.: DNAL HD1775.M8A34).

0065

**'Soybean Belt' shares acreage with corn.**  
Evans, M. Washington, D.C. : The Service. Farmline - U.S. Department of Agriculture, Economic Research Service. June 1990. v. 11 (6). p. 8-9. maps. (NAL Call No.: DNAL aHD1401.A2U52).

0066

**Test-demonstration farm results summarized for five counties in Illinois.**  
Lenkaitis, V.J. III. Weatherby, B.; Erickson, D.E. Urbana, Ill. : The Service. Farm economics facts and opinions - University of Illinois, Department of Agricultural Economics, Cooperative Extension Service. Aug 1990. (90-16). 6 p. (NAL Call No.: DNAL 281.8 F2226).

0067

**Tillage alternatives for alfalfa to corn rotation.**  
Shinners, K.J. Nelson, W.S. St. Joseph, Mich. : The Society. American Society of Agricultural Engineers (Microfiche collection). Paper presented at the 1988 Winter Meeting of the American Society of Agricultural Engineers. Available for purchase from: The American Society of Agricultural Engineers, Order Dept., 2950 Niles Road, St. Joseph, Michigan 49085. Telephone the Order Dept. at (616) 429-0300 for information and prices. 1988. (fiche no. 88-1566). 23 p. Includes references. (NAL Call No.: DNAL FICHE S-72).

0068

**Tillage system effects on crop growth and production costs for a corn-soybean rotation.**  
UPRAEN. Brown H.J. Cruse, R.M.; Colvin, T.S. Madison, Wis. : American Society of Agronomy. Journal of production agriculture. July/Sept 1989. v. 2 (3). p. 273-279. Includes references. (NAL Call No.: DNAL S539.5.U68).

0069

**A timeliness model for corn planting.**  
AAEPC. Keener, H.M. Holmes, R.G.; Gliem, J.A. St. Joseph, Mich. : The Society. Paper - American Society of Agricultural Engineers. Paper presented at the 1989 International Summer Meeting, June 25-28, 1989, Quebec, PQ, Canada. Summer 1989. (89-1023). 17 p. Includes references. (NAL Call No.: DNAL 290.9 AM32P).

0070

**Uncertainty and split nitrogen application in corn production.**  
Feinerman, E. Choi, E.K.; Johnson, S.R. Ames, Iowa : American Agricultural Economics Association. The split application of nitrogen provides insurance against the risk that late spring application will be infeasible because of wet soil. Risk aversion and production uncertainty have little impact on total nitrogen available to the crop but do affect the split in application and the total nitrogen applied. A risk-averse farmer applies more (less) nitrogen prior to planting and total nitrogen than a risk-neutral farmer if nitrogen and water are substitutes (complements). For the case of substitutes, the nitrogen lost through leaching is the premium which the risk-averse farmer pays to insure a proper level of nitrogen. American journal of agricultural economics. Nov 1990. v. 72 (4). p. 975-984. Includes references. (NAL Call No.: DNAL 280.8 J822).

0071

**Use of spectral vegetation indices to infer leaf area, evapotranspiration and yield. II. Results.**  
AGJOAT. Wiegand, C.L. Richardson, A.J. Madison, Wis. : American Society of Agronomy. Better methods of interpreting spectral observations of crop canopies in terms of agronomic characteristics such as green leaf area index (L) and aboveground dry phytomass (DM), and for estimating economic yield (Y) are needed. The equations proposed were applied to single year experiments with *Triticum aestivum* L. and *Triticum durum* Desf., *Gossypium hirsutum* L., and *Zea mays* L. in order to illustrate and further test them. As predicted fractional photosynthetically active radiation absorption (FPAR) could be estimated from vegetation indices (VI) such as perpendicular vegetation index (PVI) and the normalized difference (ND) about as well as from L. Generally, L/VI and FPAR/L verbalized as L as a function of VI, and FPAR as a function of L-were exponential relations whereas FPAR/VI were linear or nearly linear functions. The DM, Y, and the harvest index (Y/DM) were linearly related to PVI averaged for several dates during late vegetative development for wheat and corn, indicating that relative yields for both crops had been set by that development stage. The functional relations L/VI, FPAR/L, FPAR/VI, Y/VI, DM/VI, sigma APAR/sigma VI, DM/sigma APAR, Y/sigma VI and (Y/DM)/VI where APAR is

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daily absorbed PAR (MJ m<sup>-2</sup> d<sup>-1</sup>) presented document that direct spectral observations and the equations incorporating them do provide additional analytical tools for interpreting crop development, growth, and yield. *Agronomy journal*. May/June 1990. v. 82 (3). p. 630-636. Includes references. (NAL Call No.: DNAL 4 AM34P).

0072

**Using drought-stressed corn: harvesting, storage, feeding, pricing and marketing.**  
Amaral, D. Crist, B.; Heersche, G.; Johns, J.; Olson, K.; Bitzer, M.; Benson, F.; Meyer, L.; Shurley, D. Lexington, Ky. : The Service. ID - University of Kentucky, Cooperative Extension Service. Aug 1988. (86). 7 p. ill. (NAL Call No.: DNAL S544.3.K4K42).

0073

**Weed management decisions in corn based on bioeconomic modeling.**  
WEESA6. Lybecker, D.W. Schweizer, E.E.; King, R.P. Champaign, Ill. : Weed Science Society of America. A fixed (conventional) weed management strategy in corn was compared to three other strategies (two mixed and one flexible) in terms of weed control, grain yield, gross margin (gross income minus herbicide treatment costs), and herbicide use under furrow irrigation for four consecutive years. The fixed strategy prespecified preplanting, preemergence, postemergence, and layby herbicides. The flexible strategy herbicide treatments were specified by a computer bioeconomic model. Model decisions were based on weed seed in soil before planting, weed densities after corn emergence, herbicide costs, expected corn grain yield and selling price, and other parameters. The two mixed strategies were a combination of fixed and flexible strategies and designated either specified soil-applied herbicides (mixed/soil), or no soil-applied herbicide (mixed/no soil); postemergence treatments were determined by the model. Average corn grain yield was 10 280 kg ha<sup>-1</sup> and gross income was 920 \$ ha<sup>-1</sup> and neither differed among strategies. Total weed density and gross margin were significantly higher for the mixed/no soil and flexible strategies compared to the mixed/soil and fixed strategies. Total weed density averaged 28 720, 28 100, 10 910, and 680 plants ha<sup>-1</sup> for the mixed/no soil, flexible, mixed/soil, and fixed strategies, respectively. Annual gross margins for the four strategies averaged 885, 875, 845, and 810 \$ ha<sup>-1</sup>, respectively. Herbicide use over the 4-yr period for these four strategies averaged 3.8, 5.3, 20.5, and 26.9 kg ha<sup>-1</sup>, respectively, and each value differed from the other. Thus, weeds can be managed in corn, gross margins increased, and herbicide use decreased by employing a bioeconomic weed-corn model to make weed management decisions. *Weed science*. Jan/Mar 1991. v. 39 (1). p. 124-129. Includes references. (NAL Call No.: DNAL 79.8 W41).

0074

**Yield-loss relationships and economic injury levels for European corn borer (*Lepidoptera: Pyralidae*) populations infesting Pennsylvania field corn.**  
JEENAI. Bode, W.M. Calvin, D.D. Lanham, Md. : Entomological Society of America. Field studies were conducted during 1986 and 1987 to quantify the relationship between the number of European corn borer, *Ostrinia nubilalis* (Hubner), larvae per corn plant, plant growth stage, and corn grain yield for Pennsylvania. Corn plants were artificially infested with third-instar *O. nubilalis* during four plant stages (10-leaf, 16-leaf, blister, and dough) with 0, 2, 4, or 6 larvae per plant. Differences in grain weights between the uninfested check plots and highest infestation levels for 10-leaf, 16-leaf, blister, and dough stages of corn development in 1986 were 63.84, 69.07, 47.09, and 13.17 g per plant, respectively. In 1987, corn grain weights were reduced at six larvae per plant from the check by 50.57, 33.73, 22.9, and 2.79 g per plant for 10-leaf, 16-leaf, blister, and dough stages of corn development, respectively. Based on the linear regressions of the relationship between number of larvae per plant and corn grain weight for all four corn growth stages by year, average grain weight reductions across years when stalk feeding was initiated during the 10-leaf, 16-leaf, blister, and dough stages of plant development were 5.94, 5.01, 3.13, and 2.41% per larva per plant, respectively. Economic injury levels are presented for cases in which 100% control of *O. nubilalis* populations is assumed, and a method is shown for calculating economic injury level values when less than 100% control is expected. *Journal of economic entomology*. Aug 1990. v. 83 (4). p. 1595-1603. Includes references. (NAL Call No.: DNAL 421 J822).

# DISTRIBUTION AND MARKETING

0075

**Corn marketing, processing, and utilization.**  
AGRYA. Watson, S.A. Madison, Wis. : American Society of Agronomy. Agronomy. In the series analytic: Corn and Corn Improvement, Third Edition / edited by G.F. Sprague and J.W. Dudley. 1988. (18). p. 881-940. Includes references. (NAL Call No.: DNAL 4 AM392).

0076

**Herbicide-resistant plants: big market, and better weed control.**  
GTNEEA. Fort Lee, N.J. : Technical Insights, Inc. Genetic technology news. May 1989. v. 9 (5). p. 8, 11. (NAL Call No.: DNAL QH442.G445).

0077

**Projected costs and returns -- cotton, soybeans, corn, milo and wheat, northeast Louisiana, 1990.**  
Paxton, K.W. Lavergne, D.R. Baton Rouge, La. : The Station. A.E.A. information series - Louisiana Agricultural Experiment Station. Jan 1990. (78). p. A-1--A-66. (NAL Call No.: DNAL S67.E2).

0078

**Projected costs and returns--cotton, soybeans, corn, milo and wheat, Red River and Central Areas, Louisiana, 1990.**  
Lavergne, D.R. Paxton, K.W. Baton Rouge, La. : The Station. A.E.A. information series - Louisiana Agricultural Experiment Station. Jan 1990. (79). p. B-1--B-40. (NAL Call No.: DNAL S67.E2).

0079

**Projected costs and returns--soybeans, corn, milo, wheat, wheat-soybean double crop, and rice-crawfish double crop, Southwest Louisiana, 1990.**  
McManus, B. Heagler, A. Baton Rouge, La. : The Station. A.E.A. information series - Louisiana Agricultural Experiment Station. Jan 1990. (80). p. C-1--C-81. (NAL Call No.: DNAL S67.E2).

# PLANT PRODUCTION - GENERAL

0080

**Field crop production as a source of groundwater pollution the case of corn production in Pennsylvania /edited by Robert D. Weaver.**

Weaver, Robert D. University Park, Pa. : Penn State, College of Agricultural Sciences, 1991. "December 1991."~ Cover title. vii, 150 p. : ill. ; 28 cm. Includes bibliographical references. (NAL Call No.: DNAL 281.9 P38 no.227).

0081

**Scouting corn in North Carolina.**

Linker, H.M. Van Duyn, J.W.; Anderson, J.R. Jr.; Lewis, W.M. Raleigh, N.C. : The Service. AG - North Carolina Agricultural Extension Service, North Carolina State University. May 1990. (399). 11 p. (NAL Call No.: DNAL S544.3.N6N62).

# PLANT PRODUCTION - HORTICULTURAL CROPS

0082

449-454. Includes references. (NAL Call No.: DNAL 81 S012).

**Center-pivot applications of chlorpyrifos 4E for reducing ear and stalk infestations of second-generation European corn borer larvae (Lepidoptera: Pyralidae) in field corn.**

JEENA I. Currier, D.R. Witkowski, J.F. Lanham, Md. : Entomological Society of America. Journal of economic entomology. Dec 1988. v. 81 (6). p. 1765-1767. Includes references. (NAL Call No.: DNAL 421 J822).

0083

**Cost of growing corn and soybeans in 1989.**

Lattz, D.H. Urbana, Ill. : The Service. Farm economics facts and opinions - University of Illinois, Department of Agricultural Economics, Cooperative Extension Service. May 1990. (90-6). 5 p. (NAL Call No.: DNAL 281.8 F2226).

0084

**Surfactant-induced ethylene production by leaf tissue.**

JOSH. Lownds, N.K. Bukovac, M.J. Alexandria, Va. : The Society. Ethylene evolution induced by nonionic (Triton X-100, Triton X-405, Tween 20, Ortho X-77 and Regulaid), anionic (Aerosol OT and Dupanol ME), and cationic (Arquad C-50 and Arquad 2C-75) surfactants was characterized using cowpea *Vigna unguiculata* (L.) Walp. subspp. *unguiculata* 'Dixielee' seedlings. Representative surfactants of each ionogenic class induced ethylene evolution. Time course studies revealed an increased rate of ethylene evolution during the first 6 to 12 hr after treatment, followed by a slow decrease for the next 12 to 36 hr, and a return to control levels within 48 hr. Ethylene production induced by Triton X-100 increased with increasing concentration, while Tween 20 did not induce ethylene at concentrations up to 1.0%. Surfactants that promoted ethylene evolution also generally induced visible phytotoxicity. Phytotoxicity symptoms increased with increasing time after treatment.

Surfactant-induced ethylene production and phytotoxicity were observed with corn (*Zea mays* L. 'B73 x M017'), wheat (*Triticum aestivum* L. 'Hillsdale'), soybean (*Glycine max* Merr. 'McCall'), apple (*Malus domestica* Borkh. 'Golden Delicious'), and sour cherry (*Prunus cerasus* L. 'Montmorency'). Tween 20, nonactive on cowpea, induced ethylene and phytotoxicity when applied to the abaxial surface of sour cherry leaves. Chemical names used: octylphenoxypoly(ethoxy)ethanol (Triton X-100 and X-405), polyoxyethylene sorbitan monolaurate (Tween 20), alkylaryl polyoxyethylene glycols/free fatty acids/isopropanol (Ortho X-77), polyoxyethylenepolypropoxypropanol alkyl 2-ethoxyethanol/dihydroxy-propane (Regulaid), diocetyl sodium sulfosuccinate (Aerosol OT), sodium lauryl sulfate (Dupanol ME), monococo trimethyl ammonium chloride (Arquad C-50), dicoco dimethyl ammonium chloride (Arquad 2C-75). Journal of the American Society for Horticultural Science. May 1989. v. 114 (3). p.

# PLANT PRODUCTION - FIELD CROPS

0085

**Aboveground dry weight and yield responses of irrigated field corn to defoliation and root pruning stresses.**

JEENAI. Gibb, T.J. Higgins, R.A. Lanham, Md. : Entomological Society of America. Insecticide-modified levels of western corn rootworm, *Diabrotica virgifera virgifera* LeConte, larval feeding, manually applied preautotrophic (seedling stage) defoliation, and autotrophic (four-leaf stage) defoliation were evaluated for their independent and combined effects on aboveground dry matter production and grain yield of field corn, *Zea mays* L. Defoliations were imposed to simulate cutworm feeding damage, late frosts, or hail. Total reductions in leaf dry weight attributable to treatments became less evident as plants compensated over time. However, leaf groups undergoing initiation or expansion when stresses were imposed produced significantly less dry weight after each treatment was applied and were not able to compensate fully by season's end. Stalk dry weights showed less change than leaves after treatment. However, once detectable, reductions in stalk dry weight remained significant throughout the growing season. Decreases of 3-12% in corn yield were attributable to root pruning stress from larval feeding. Grain yield decreased 3-9% in response to seedling defoliation and 13-22% following four-leaf stage defoliation. Yield declines resulted from reduction of total kernels per ear (both kernels per row and kernel rows) and not from kernel weight, which suggests that treatments effectively stressed plants before or during kernel initiation rather than during kernel fill. Significant treatment interactions were evident in responses of some vegetative and dry weight yield parameters. In each instance, less reduction was caused by combinations of treatments than was expected if effects of single treatments were added. Journal of economic entomology. Oct 1991. v. 84 (5). p. 1562-1576. Includes references. (NAL Call No.: DNAL 421 J822).

0086

**Aflatoxin accumulation in inoculated ears of field-grown maize.**

PLDIDE. Payne, G.A. Hagler, W.M. Jr.; Adkins, C.R. St. Paul, Minn. : American Phytopathological Society. Plant disease. May 1988. v. 72 (5). p. 422-424. Includes references. (NAL Call No.: DNAL 1.9 P69P).

0087

**Annual weed control with selected herbicides in field corn grown in coarse-textured soil /R.N. Arnold ... et al.**

Arnold, R. N. Las Cruces, N.M. ; New Mexico State University, Agricultural Experiment Station, 1990. Caption title.~ "January 1990." . 5 p. ; 28 cm. Bibliography: p. 5. (NAL Call No.: DNAL 100 N465R no.643).

0088

**Breakage susceptibility of corn kernels in relation to crop management under long growing season conditions.**

AGJOAT. Vyn, T.J. Moes, J. Madison, Wis. : American Society of Agronomy. Corn (*Zeal mays* L.) kernels are subject to breakage during postharvest handling. Manipulation of crop management factors has influenced kernel breakage susceptibility, but the effects of hybrid, plant density, harvest moisture content, and drying temperature on breakage susceptibility have not been studied under long growing season conditions. Field experiments were conducted in 1985 and 1986 at Ridgetown, Ontario. Five commercial hybrids were grown at different plant densities (5.5 and 7.0 plant m<sup>-2</sup> in both years, and 6.3 plants m<sup>-2</sup> in 1985), harvested at 300 and 240 g kg<sup>-1</sup> moisture content (wet basis), and dried at different air temperatures (20, 40, and 80 degrees C in 1985; 20 and 100 degrees C in 1986) to approximately 150 g kg<sup>-1</sup> moisture content. A Wisconsin breakage tester was used to measure breakage susceptibility. Small increases in breakage were consistently associated with increased plant densities. Reductions in breakage were sometimes associated with lower grain moisture content at harvest. The largest and most consistent changes in breakage susceptibility were due to changes in drying temperatures. Increased drying temperatures resulted in increased breakage, but there was variation among the hybrids in the size of the response. The results indicate that breakage susceptibility is an inherited trait that is also influenced by crop management. Kernel breakage can be reduced by proper choice of hybrids, drying in low air temperature, and harvesting at low grain moisture content. In both years, increased breakage susceptibility was related to higher levels of endosperm stress cracks, tendency towards roundness in shape, and increased levels of harvest damage in the form of visible chips or cracks. Agronomy journal. Nov/Dec 1988. v. 80 (6). p. 915-920. Includes references. (NAL Call No.: DNAL 4 AM34P).

0089

**Chemical weed control in corn.**

Johnson, W.C. III. Athens, Ga. : The Service. Bulletin - Cooperative Extension Service, University of Georgia, College of Agriculture. Jan 1989. (930,rev.). 11 p. (NAL Call No.: DNAL 275.29 G29B).

0090

**Conservation tillage for corn depends on soil conditions.**

Cox, W.J. Van Es, H.M. Canton, N.Y. : Agricultural Division, St. Lawrence County Cooperative Extension Association. St. Lawrence County cooperative extension news. Apr 1989. v. 73 (4). p. 9. (NAL Call No.: DNAL S544.3.N7S3).

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0091

## Corn & soybean field guide.

Harms, C.L. Nielsen, R.L.; Semmel, T.W.; Edwards, C.R.; Dbermeyer, J.L.; Childs, D.J.; Jordan, T.N.; Scott, D.H. West Lafayette, Ind.: The Service. Publication I.D. - Cooperative Extension Service, Purdue University. May 1988. (179). 85 p. ill., maps. (NAL Call No.: DNAL 275.29 IN2ID).

0092

## Corn and corn improvement /G.F. Sprague and J.W. Dudley, editors.

Sprague, Gretchen.; Dudley, J. W.\_1931-. Madison, Wis. : American Society of Agronomy, c1988. xix, 986 p. : ill. (some col.) ; 24 cm. Includes bibliographies and index. (NAL Call No.: DNAL 4 Am392 no.18 1988).

0093

## Corn and soybean yield trends: evidence from well managed farms.

JPRAEN. Chicoine, D.L. Scott, J.T. Jr. Madison, Wis. : American Society of Agronomy. Journal of production agriculture. July/Sept 1988. v. 1 (3). p. 211-216. Includes references. (NAL Call No.: DNAL S539.5.J68).

0094

## Corn growth and yield as affected by surface and subsoil compaction.

AGJDAT. Voorhees, W.B. Johnson, J.F.; Randall, G.W.; Nelson, W.W. Madison, Wis. : American Society of Agronomy. Wheel traffic of harvesting operations on agricultural fields often carries compactive loads in excess of 8 Mg. Consequently, soil physical properties may be affected to depths of 60 cm, and these effects of compaction may persist for a number of years. In addition, smaller compactive forces that affect only the surface layer of soil are applied annually during spring tillage and planting operations. A replicated field study was conducted on a Webster clay loam (fine-loamy, mixed, mesic Typic Haplauolls) in southern Minnesota, and two Ves clay loams (fine-loamy, mixed, mesic Udic Haplustolls) in southwestern Minnesota to assess the effects of surface and subsoil compaction on the growth and yield of corn (*Zea mays L.*). A total of six compaction treatments was imposed: subsoil compaction of control (no subsoil compaction), 9 Mg per axle, and 18 Mg per axle loads, each with and without annually applied interrow surface compaction of less than 4.5 Mg per axle. During the first year after high axle loading, 9 and 18 Mg per axle loads significant decreased final grain yield by 9 and 30%, respectively, on the Webster soil. For the second , the 18 Mg per axle treatment significant reduced yield by 12% as compared with the control treatment. Soil water loss data indicate a more shallow rooting depth and/or reduced root activity in the 18 Mg per

axle treatment. High axle loads on a dry Ves soil caused little subsoil compaction; grain yield was reduced by only 6% the first year after high axle loading. High axle loads on a relatively wet Ves soil compacted the soil to a depth of 60 cm. However, relatively dry climatic conditions the following year negated any potential adverse effects of subsoil compaction and yields were not affected. Surface layer compaction from annual interrow wheel traffic did not cause a significant yield response consistently at any site. Agronomy journal. Mar/Apr 1989. v. 81 (2). p. 294-303. Includes references. (NAL Call No.: DNAL 4 AM34P).

0095

## Corn growth retardation resulting from soybean herbicide residues.

DJSCA. Beuerlein, M. Loux, M.; Beuerlein, J. Columbus, Ohio : Ohio Academy of Science. Ohio journal of science. June 1990. v. 90 (3). p. 67-70. Includes references. (NAL Call No.: DNAL 410 DH3).

0096

## Corn residue effect on the yield of corn and soybean grown in rotation.

AGJDAT. Crookston, R.K. Kurle, J.E. Madison, Wis. : American Society of Agronomy. Crop rotation provides a yield benefit that persists at optimal management levels. The exact reason for the rotation effect is unknown. One theory is that a given crop's own residue has an auto-inhibitory effect when that crop is maintained under monoculture, and/or that residues of alternate crops have a stimulatory effect on one another under rotation. We conducted field studies at Lamberton, Rosemount, and Waseca, MN to test this theory. Soils at these locations are: Webster clay loam (fine-loamy, mixed mesic Typic Haplauolls), Waukegan silt loam (fine-silty, over sandy, mixed mesic Typic Hapludolls), and Nicollet clay loam (fine-loamy, mixed, mesic Aquic Hapludolls), respectively. A series of 3-yr crop sequences were established at each site. In the first year the experimental area was kept fallow. In the second year half of each replicated plot was planted to corn (*Zea mays L.*) and half to soybean (*Glycine max (L.) Merr.*). After grain harvest all above-ground corn residue was removed from half of the corn area and transferred to half of the soybean area. All plots were then moldboard plowed. In the spring of the third year all plots were disked and planted uniformly in corn (1981, 1982) or soybean (1983, 1984). There was a significant effect of previous crop (rotation effect) on the yield of both corn and soybean, but the removal or addition of corn residue had no effect on the yield of either crop. This indicates that the yield response of corn and soybean to rotation is not due to beneficial or negative effects of decomposing above-ground residue. Agronomy journal. Mar/Apr 1989. v. 81 (2). p. 229-232. Includes references. (NAL Call No.: DNAL 4 AM34P).

## (PLANT PRODUCTION - FIELD CROPS)

0097

### Corn response to rye cover crop management and spring tillage systems.

AGJOAT. Rainbault, B.A. Vyn, T.J.; Tollenaar, M. Madison, Wis. : American Society of Agronomy. The use of a winter rye (*Secale cereale* L.) corn (*Zea mays* L.) double cropping sequence in combination with appropriate tillage practices could increase biomass production and reduce soil erosion potential in southern Ontario. A 3-yr study (1982-1984) was conducted at two locations to determine the potential of this sequence for double cropping, and to evaluate spring tillage systems and management of the rye residue on subsequent productivity of corn. Winter rye was planted in early October after corn silage harvest and either chemically killed or harvested as silage in the spring before corn planting. Rye treatments consisted of no rye, rye harvested in the spring and rye residue left on the plots. Spring cultivation treatments were no-till, tandem discing, and moldboard plowing followed by secondary tillage. The use of a winter rye cover crop delayed corn development and reduced corn biomass yield by 11% at the Elora location and by 17% at the Woodstock location. The adverse effect of the rye crop was more pronounced under no-till than where the soil was tilled. Removal or retention of the rye residue had no consistent effect on the subsequent corn crop. An allelopathic effect resulting from the rye crop may be one plausible explanation for the reduction in corn yield. Total biomass yield (rye + corn) was increased relative to corn alone, if the soil was cultivated. Therefore, a winter rye-corn sequence may still be of interest, despite a reduction in corn yield, especially if advantages such as total biomass production and the potential for decreased soil erosion during fall and winter are considered. *Agronomy journal*. Nov/Dec 1990. v. 82 (6). p. 1088-1093. Includes references. (NAL Call No.: DNAL 4 AM34P).

0098

### Corn response to rye cover crop, tillage methods, and planter options.

AGJOAT. Raimbault, B.A. Vyn, T.J.; Tollenaar, M. Madison, Wis. : American Society of Agronomy. Studies in Ontario have shown that corn (*Zea mays* L.) yields are reduced when corn is seeded immediately after rye (*Secale cereale* L.) harvest or chemical kill of winter rye. A study was conducted in 1983 and 1984 on a Maryhill (Typic Hapludalf) loam soil to determine the effect of spring tillage systems and timing of rye chemical kill on the subsequent corn crop. The rye was seeded in early October after corn silage harvest. The tillage treatments consisted of (i) moldboard plow plus secondary tillage, (ii) strip tillage, (iii) no-tillage with ripple coulters (iv) no-tillage with disc furrowers plus plow coulters, and (v) no-tillage with ripple coulters plus plow coulters. The rye kill treatments were early (2 wk before planting) or late (just prior to corn planting). Corn whole-plant yields averaged 13.6 and 12.4 Mg

ha<sup>-1</sup> for early and late rye kill, respectively. Corn yield in the moldboard plow treatment was higher than in strip tillage and the average of no-till treatments; however, using disc furrowers produced yields equal to those with the moldboard plow treatment. Moving the residue out of the row with disc furrowers resulted in corn yields that were significantly higher than those in no-till treatments with ripple coulters. The improvement in plant growth due to an early rye kill (as opposed to a late rye kill) was often greater with the conservation tillage systems relative to the moldboard plow treatment. A crop production system is proposed involving chemical control of a winter rye cover crop 2 wk before corn planting and planting the corn with a modified no-till system that removes rye residue from the row area. *Agronomy journal*. Mar/Apr 1991. v. 83 (2). p. 287-290. Includes references. (NAL Call No.: DNAL 4 AM34P).

0099

### Corn, sorghum, and soybean response to irrigation in the Mississippi River alluvial plain.

CRPSAY. Heatherly, L.G. Wesley, R.A.; Elmore, C.D. Madison, Wis. : Crop Science Society of America. The most agronomically efficient use of irrigation water is for those crops that give the greatest response. In the Mississippi River alluvial plain, the primary irrigated crop is soybean *Glycine max* (L.) Merr., but the response of soybean to irrigation has not been compared to that of other crops. Irrigated and nonirrigated experiments were conducted from 1984 through 1987 on Tunica clay (clayey over loamy, montmorillonitic, nonacid, thermic Vertic Haplaquept) to determine the effect of irrigation on field-grown corn (*Zea mays* L.), sorghum *Sorghum bicolor* (L.) Moench, and soybean yield and yield components. Shifts in weed species composition resulting from continuous monocropping with these crops also were quantified. Irrigation was applied from beginning bloom to near maturity of each crop whenever soil water potential at the 30-cm soil depth averaged about -70 kPa. Irrigation did not consistently affect weed cover in any of the crops. Weed level differences among crops resulted from different weed control programs for each continuous cropping system. Differences between average seed yields of irrigated (I) and nonirrigated (NI) corn, sorghum, and soybean were 2886, 694, and 1574 kg ha<sup>-1</sup>, respectively. Sorghum produced the most stable nonirrigated yield and the smallest increase in monetary return from irrigation. Differences between I and NI corn and soybean yields were associated with increased number of seed. Smaller sorghum yield differences were associated with differences in seed weight or a combination of differences in seed weight and number of seed. Across the 4 yr, irrigation of corn and soybean produced nearly equal increases in gross income per unit of land area, but irrigation efficiency for soybean was lower because achieving the increased return from irrigation required nearly twice as much water for soybean as for corn. *Crop science*. May/June 1990. v. 30 (3). p. 665-672. Includes

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references. (NAL Call No.: DNAL 64.8 C883).

### 0100

#### Corn yield and residual soil nitrate as affected by time and rate of nitrogen application.

AGJOAT. Jokela, W.E. Randall, G.W. Madison, Wis. : American Society of Agronomy. Efficient use of N fertilizer for corn (*Zea mays L.*) production is important for increasing economic return to the grower and for minimizing the potential impact on water quality. Time and rate of application are important management tools for improving N efficiency. This experiment was conducted for 3 yr on two nonirrigated southern Minnesota soils--a Mt. Carroll silt loam (fine-silty, mixed, mesic Mollic Hapludalf) and a Webster clay loam (fine-loamy, mixed, mesic Typic Haplaquoll)--to evaluate the effect of time and rate of N application on corn yield. N uptake and residual soil NO<sub>3</sub>(-i)-N. Nitrogen as (NH<sub>4</sub>)<sub>2</sub>SO<sub>4</sub> was applied in a factorial arrangement of N rate (low and high) and time of application (at planting (PL), eight-leaf stage (8L), or split evenly between the two times (SP)). A zero N control and a very high N rate at PL were also included. Nitrogen rates were 75, 150, and 225 kg ha<sup>-1</sup> on the Mt. Carroll, and 100, 200, and 300 kg ha<sup>-1</sup> on the Webster. Grain and total dry matter (DM) yield, and plant uptake of N were increased by N application in five of six site years, in most cases up to the high N rate. Delayed N application (8L or SP vs. PL) resulted in either no effect or a slight decrease in DM and in variable effects on N uptake, depending on the year and location. Residual NO<sub>3</sub>(-i)-N in the 1.5 m profile ranged from 150 to 400 kg ha<sup>-1</sup> for most treatments in the fall but was 50 to 70% lower the following spring. Residual NO<sub>3</sub>(-i) in the fall was consistently increased by delayed application of the high N rate from the PL to 8L stage, with most of the increase occurring in the upper 0.6 m of the profile. The decrease in residual NO<sub>3</sub>(-i) from fall to spring, attributed in part to leaching beyond the sampled zone, minimized the potential carryover effect for the next year's production and indicated a potential for greater environmental impact where N application was delayed. Dry matter production, N uptake, and residual NO<sub>3</sub>(-i)-N were affected by unusually. Agronomy journal. Sept/Oct 1989. v. 81 (5). p. 720-726. Includes references. (NAL Call No.: DNAL 4 AM34P).

### 0101

#### Corn yield response to tillage, hybrids, and insecticides.

Espaillet, J.R. Gallaher, R.N. Gainesville, Fla. : The Stations. Agronomy research report AY - Agricultural Experiment Stations, University of Florida. 1989. (89-06). 15 p. Includes references. (NAL Call No.: DNAL S540.A2F62).

### 0102

#### Corn yield response to water stress, heat units, and management: model development and calibration.

SSSJJD4. Swan, J.B. Staricka, J.A.; Shaffer, M.J.; Paulson, W.H.; Peterson, A.E. Madison, Wis. : The Society. A crop model for corn is presented that uses readily available soil, crop, meteorological, and management data as inputs to integrate the effects on grain yield of water stress, plant density, deficit of growing degree days, and planting date. The model can be run on an IBM-PC, was developed for use in the deep loessial lands of the Upper Mississippi Valley in Major Land Resource Area (MLRA) 105 and associated soil areas, and was calibrated using data for 1972 through 1984 from tillage-residue management experiments at Lancaster, WI. Estimated water stress, deficit in air-temperature growing degree days (GDD), and plant density accounted for 77% of the 79% of yield variation explained by the model. The standard error of estimate for predicted yield was 0.67 Mg ha<sup>-1</sup>. Presence in the data set of interactions between water stress and GDD, and also water stress with plant density, allowed their incorporation into the model. Tillage and residue management had the principal effects of modifying plant density, soil water storage, and rate of phenologic development to the six-leaf stage. Soil Science Society of America journal. Jan/Feb 1990. v. 54 (1). p. 209-216. Includes references. (NAL Call No.: DNAL 56.9 S03).

### 0103

#### Corn (*Zea mays*) tolerance and weed control with thiameturon.

WETEE9. Eberlein, C.V. Miller, T.L. Champaign, Ill. : The Society. Weed technology : a journal of the Weed Science Society of America. Apr/June 1989. v. 3 (2). p. 255-260. Includes references. (NAL Call No.: DNAL SB610.W39).

### 0104

#### Corncribs in history, folklife & architecture /Keith E. Roe.

Roe, Keith E. Ames : Iowa State University Press, 1988. Includes index. xi, 103 p. : ill. (some col.) ; 22 x 29 cm. Bibliography: p. 96-99. (NAL Call No.: DNAL TH4935.R64 1988).

### 0105

#### Cornfield traffic cops.

Reichenberger, L. Philadelphia, Pa. : The Journal. Farm journal. Feb 1989. v. 113 (3). p. 18-19. ill. (NAL Call No.: DNAL 6 F2212).

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0106

**Cost of growing corn and soybeans in 1989.**  
Lattz, D.H. Urbana, Ill. : The Service. Farm economics facts and opinions - University of Illinois, Department of Agricultural Economics, Cooperative Extension Service. May 1990. (90-6). 5 p. (NAL Call No.: DNAL 281.8 F2226).

0107

**Cover crop management and nitrogen rate in relation to growth and yield of no-till corn.**  
AGJOAT. Waggoner, M.G. Madison, Wis. : American Society of Agronomy. Cover crop management in no-tillage systems prior to planting the principal crop can be an important tool in maximizing the beneficial effects of the cover crop on the principal crop. A field experiment was conducted in 1984 and 1985 to examine timing effects of cover crop desiccation relative to corn planting: early desiccation/early plant (EE), early desiccation/late plant (EL), and late desiccation/late plant (LL) and fertilizer N (0, 100, and 200 kg ha<sup>-1</sup>) on corn growth and yield. These management schemes were evaluated for fallow, rye (*Secale cereale* L.), crimson clover (*Trifolium incarnatum* L.), and hairy vetch (*Vicia villosa* Roth.) cover crop systems. Corn dry matter production and N uptake, monitored in all 0 kg N ha<sup>-1</sup> treatments, were significantly affected by cover crop management and varied according to stage of development and climatic conditions. Cover crop type had a pronounced effect on corn growth, with corn dry matter production in a rye cover crop lower than in legume cover crops. Grain yield response to applied N was greatest in a rye cover crop system. In contrast, a grain yield response up to the first increment of fertilizer N (100 kg ha<sup>-1</sup>) in legume cover crop systems was observed only in 1984. Corn recovery of legume N was estimated at 40 to 45 kg N ha<sup>-1</sup> (2-yr avg.), representing approximately 36 and 30% of the total N content of crimson clover and hairy vetch, respectively. These data indicate that winter annual legume cover crops are capable of providing a substantial portion of the N required by corn. Additionally, cover crop management should insure that corn planting is not delayed to allow for additional legume growth and N production. *Agronomy journal*. May/June 1989. v. 81 (3). p. 533-538. Includes references. (NAL Call No.: DNAL 4 AM34P).

0108

**Crop production during conversion from conventional to low-input methods.**  
AGJOAT. Liebhardt, W.C. Andrews, R.W.; Culik, M.N.; Harwood, R.R.; Janke, R.R.; Radke, J.K.; Rieger-Schwartz, S.L. Madison, Wis. : American Society of Agronomy. A 5-yr cropping system experiment was initiated in 1981 to study transition from a conventional agricultural system using pesticides and fertilizers to a low-input system. The site was primarily Comly silt loam (fine-loamy, mixed, mesic, Typic

Fragiudalf) with 12% Berks shaly silt loam (loamy-skeletal, mixed, mesic, Typic Dystrochrept), and a small area of Duffield silt loam (fine-loamy, mixed, mesic, Ultic Hapludalf), in Berks County, eastern Pennsylvania. Three 5-yr rotations were compared. A conventional corn (*Zea mays* L.)-soybean (*Glycine max* (L.) Merr.) rotation (designated "conventional") was compared to two low-input rotations which utilized oat (*Avena sativa* L.), red clover (*Trifolium pratense* L.), and winter wheat (*Triticum aestivum* L.), in addition to corn and soybean. One low-input rotation used cattle manure as a nutrient source and produced forage crops in addition to cash crops (designated "low-input/livestock"), while the other used legume crops as a nutrient source, and produced a cash crop every year (designated "low-input/cash grain"). Corn grain yields in the low-input systems were 75% of conventional in 1981 to 1984, but yields were not significantly different in 1985. Weed competition and insufficient N limited low-input corn yields during the first 4 yr. Soybean yields in the low-input systems were equal to or greater than conventional all 5 yr. It is concluded that a favorable transition from input-intensive cropping to low-input systems is feasible, but only if crop rotations are used which include crops that demand less N and are competitive with weeds, such as small grain, soybean, or legume hay. Corn should be avoided for the first 3 to 4 yr. *Agronomy journal*. Mar/Apr 1989. v. 81 (2). p. 150-159. Includes references. (NAL Call No.: DNAL 4 AM34P).

0109

**Crop rotations: still the norm.**  
Foulke, J. Washington, D.C. : The Service. Farmlife - U.S. Department of Agriculture, Economic Research Service. May 1990. v. 11 (5). p. 4-6. (NAL Call No.: DNAL aHD1401.A2U52).

0110

**Damage by stalkborers (Lepidoptera: Pyralidae) to corn in northeastern Mexico.**  
JEENAI. Rodriguez-del-Bosque, L.A. Smith, J.W. Jr.; Browning, H.W. Lanham, Md. : Entomological Society of America. *Journal of economic entomology*. Dec 1988. v. 81 (6). p. 1775-1780. Includes references. (NAL Call No.: DNAL 421 J822).

0111

**Demonstration of a water management system to improve nitrogen efficiency and reduce environmental impacts.**  
Melvin, S.W. Kanwar, R.S.; Horton, R. Jr. Ames, Iowa : The Service. PM - Iowa State University, Cooperative Extension Service. In the series analytic: Integrated Farm Management Demonstration Program. 1990 Progress Report. Jan 1991. (1417). p. 99-102. (NAL Call No.: DNAL 275.29 I09PA).

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0112

Demonstration of weed management practices for improved energy management and reduced potential for water contamination.

Hartzler, R. Van Kooten, B. Ames, Iowa : The Service. PM - Iowa State University, Cooperative Extension Service. In the series analytic: Integrated Farm Management Demonstration Program. 1990 Progress Report. Jan 1991. (1417). p. 85-88. (NAL Call No.: DNAL 275.29 IO9PA).

0113

Desorption of atrazine and cyanazine from soil. JEVQAA. Clay, S.A. Allmaras, R.R.; Koskinen, W.C.; Wyse, D.L. Madison, Wis. : American Society of Agronomy. Removal of soluble soil organic carbon (SSOC) during herbicide desorption studies using the batch equilibration method may affect the herbicide-soil-solution equilibrium particularly if herbicide-SSOC complexes can form. Desorption characteristics of atrazine (2-chloro-4-ethylamino-6-isopropylamino-s-triazine) and cyanazine (2-4-chloro-6-(ethylamino)-s-(triazine-2-ylamino)-2-methylpropionitrile were determined in a Ves clay loam (Aquic Hapludolls). For adsorption, the soil was equilibrated with 0.01 M CaCl<sub>2</sub> solutions containing atrazine or cyanazine. Desorption with 0.01 M CaCl<sub>2</sub> each day for 5 d resulted in hysteresis when compared to the adsorption isotherm. Replacement of the equilibration solution with soil extract for 5 d, while maintaining a higher SSOC content in the desorption equilibration solution than did the CaCl<sub>2</sub> solution, did not change desorption isotherm equations. The SSOC-herbicide complexes were not detected in any of the adsorption and desorption equilibration solutions by ultrafiltration (membranes with molecular mass cut offs of 10 000 and 500 daltons), HPLC, or TLC techniques. Either s-triazine-SSOC complexes were not formed in sufficient quantities or they were not stable enough to affect desorption of the herbicide during batch equilibration. Journal of environmental quality. Oct/Dec 1988. v. 17 (4). p. 719-723. Includes references. (NAL Call No.: DNAL QH540.J6).

0114

Development of tools for evaluating herbicide injury to corn /by James R. Smart.

Smart, James R. 1991. i, 5 v. 3  
(Ph.D.)--University of Nebraska--Lincoln, 1991. viii, 122 leaves : ill. ; 28 cm. Includes bibliographical references. (NAL Call No.: NBU LD3656.5 1991 S637).

0115

Economies of herbicide use on corn (*Zea mays*) and soybeans (*Glycine max*) in Ontario. WETEE9. Stemmeroff, M. Swanton, C.J.; Hamill, A.S.; Brown, R.H. Champaign, Ill. : The Society. Weed technology : a journal of the Weed Science Society of America. Oct 1988. v. 2 (4). p. 466-472. Includes references. (NAL Call No.: DNAL SB610.W39).

0116

Effect of fertilization method and tillage on nitrogen-15 recovery by corn.

AGJOAT. Timmons, D.R. Cruse, R.M. Madison, Wis. : American Society of Agronomy. Fertilizer N utilization by corn (*Zea mays L.*) is influenced by different fertilizer management and tillage systems. A study was conducted in central Iowa during two consecutive years to evaluate the uptake and recovery of labeled N for continuous corn grown in two tillage systems with two fertilization methods. Tillage systems were fall moldboard-plow and ridge-till. Labeled N (5% 15N) as 28% urea-ammonium nitrate solution (UAN) was either surface-applied in the fall before any primary tillage or banded (knifed-in) between rows at 224 kg N ha<sup>-1</sup> just before planting. Depending on tillage and fertilization method, corn grain yields ranged from 1.3 to 7.3 Mg ha<sup>-1</sup> which were below normal due to adverse weather conditions during the two growing seasons. The percent of plant N derived from labeled N (Nf) in the sixth leaf (50% silk) and in mature grain, stover, and whole plants was significantly lower for fall surface-applied 15N than for spring banded 15N. For mature whole plants, Nf ranged from 9 to 59% and averaged 53% for spring banded and 17% for fall surface applied 15N. Labeled N recovery by mature corn grain was affected by fertilization method and growing season and ranged from 1 to 25% during the 2-yr period. Labeled N recovery by mature whole plants ranged from 2 to 41% and averaged four times greater for spring banded than for fall surface-applied 15N. About 1 yr after application, an average of 20% of the 15N remained in the soil profile; and 95% of the residual 15N was found in the organic N pool. Compared with spring banded N, fall surface-applied N was extremely inefficient for both tillage systems. Agronomy journal. July/Aug 1990. v. 82 (4). p. 777-784. Includes references. (NAL Call No.: DNAL 4 AM34P).

0117

Effect of insecticide treatments on root lodging and yields of maize in controlled infestations of western corn rootworms (Coleoptera: Chrysomelidae).

JEENAI. Sutter, G.R. Fisher, J.R.; Elliott, N.C.; Branson, T.F. Lanham, Md. : Entomological Society of America. Granular soil insecticides were applied at planting time to plots of maize (*Zea mays L.*) infested with known populations of eggs of western corn rootworm, *Diabrotica virgifera virgifera* LeConte, to determine how

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treatments protected plants from root lodging and yield loss caused by larval feeding. The percentage of lodged plants increased significantly with increases in egg density. Percentage lodging in untreated plots also differed significantly between years, and there was a significant year-by-egg density interaction. Insecticides significantly reduced root lodging, but lodging in carbofuran-treated plots was greater than in all other treatments. Percentage yield loss caused by larval feeding was consistent each year for each egg density, and yield loss was significantly greater in plots infested with higher egg densities. Terbufos and isofenphos were not consistent in preventing yield loss; these insecticides caused a significant year-by-treatment interaction. As main effects, yield protection by insecticides was consistent each year, and the insecticides did not differ in their ability to protect yield. Yields in treated plots infested with 300 and 600 eggs per 0.3 m of row did not differ significantly from untreated plots; however, yields in treated plots infested with 1,200 and 2,400 eggs per 0.3 m of row were significantly higher when insecticides were used. Correlations between root damage ratings and yields of untreated plants were highly significant. For insecticide-treated plots, root damage ratings were not significantly correlated with yield, which suggests that root damage ratings are poor criteria for evaluating insecticide efficacy. *Journal of economic entomology*. Dec 1990. v. 83 (6). p. 2414-2420. Includes references. (NAL Call No.: DNAL 421 J822).

0118

**The effect of sethoxydim on corn (*Zea mays*) and giant foxtail (*Setaria faberii*).**  
WEESA6. Chernicky, J.P. Gast, R.; Slife, F.W. Champaign, Ill. : Weed Science Society of America. Corn and giant foxtail response to foliar-applied sethoxydim at 67, 134, and 200 g ai/ha was evaluated in field studies. Sethoxydim applied over the top of corn (60 cm tall) caused greater whorl damage and reduced corn grain yield more than postdirected sethoxydim. Sethoxydim controlled giant foxtail best when used in conjunction with a preemergence application of metolachlor (2.2 kg/ha) and atrazine (1.7 kg/ha). *Weed science*. July 1989. v. 37 (4). p. 600-603. Includes references. (NAL Call No.: DNAL 79.8 W41).

0119

**Effects of northern leaf blight and detasseling on yields and yield components of corn inbreds.**  
PLDIDE. Bowen, K.L. Pedersen, W.L. St. Paul, Minn. : American Phytopathological Society. Plant disease. Nov 1988. v. 72 (11). p. 952-956. Includes references. (NAL Call No.: DNAL 1.9 P69P).

0120

**Effects of plant bioregulators on nutrients, insect resistance, and yield of corn (*Zea mays* L.).**  
JAFCAU. Hedin, P.A. Williams, W.P.; Davis, F.M.; Thompson, A.C. Washington, D.C. : American Chemical Society. *Journal of agricultural and food chemistry*. July/Aug 1988. v. 36 (4). p. 746-748. Includes references. (NAL Call No.: DNAL 381 J8223).

0121

**Effects of rates of nitrogen fertilization on corn yields, nitrogen losses from soils, and energy consumption.**

Blackmer, A.M. Binford, G.D.; Morris, T. Ames, Iowa : The Service. PM - Iowa State University, Cooperative Extension Service. In the series analytic: *Integrated Farm Management Demonstration Program*. 1990 Progress Report. Jan 1991. (1417). p. 27-33. (NAL Call No.: DNAL 275.29 I09PA).

0122

**Effects of the onespotted stink bug (*Hemiptera: Pentatomidae*) on growth and yield of corn.**

JEENAI. Annan, I.B. Bergman, M.K. College Park, Md. : Entomological Society of America. *Journal of economic entomology*. Apr 1988. v. 81 (2). p. 649-653. Includes references. (NAL Call No.: DNAL 421 J822).

0123

**Effects of tillage, nitrogen management, and interseeding hairy vetch on continuous corn /by Randall E. Brown.**

Brown, Randall E. 1990. Thesis (M.S.)--University of Nebraska--Lincoln, 1990. 99 leaves : ill. ; 28 cm. Includes bibliographical references. (NAL Call No.: NBU LD3656 1990 B7687).

0124

**Effects of tillage on trifluralin residue carryover injury to corn (*Zea mays*).**

WEESA6. Hartzler, R.G. Fawcett, R.S.; Owen, M.D.K. Champaign, Ill. : Weed Science Society of America. Trifluralin was evaluated at 1.1, 2.2, and 4.5 kg/ha in 1983 and 1984 at two locations in Iowa for residue carryover injury to corn the following seasons. Three methods of seedbed preparation (no-till, moldboard, and chisel plowing) for corn planting were also examined. There was no effect on corn growth at the 1.1 kg/ha rate of trifluralin. Averaged over the four experiments, reductions in corn height of 8 and 24% were observed 5 weeks after planting at 2.2 and 4.5 kg/ha, respectively. The relative degree of stunting due to trifluralin decreased as the growing season progressed. Early-season carryover injury was

## (PLANT PRODUCTION - FIELD CROPS)

more severe in reduced tillage than in moldboard plow treatments in the 1983-1984 Nashua experiment. Moldboard and chisel plowing reduced the concentration of trifluralin in the 0- to 7.5-cm zone of the soil profile by 62 and 31%, respectively, when compared to no-till. No yield reductions were observed at the 1.1 or 2.2 kg/ha rate of trifluralin. In 1984, grain yields were reduced by 8 and 16% at Ames and Nashua, respectively, by the 4.5 kg/ha trifluralin rate. *Weed science*. July 1989. v. 37 (4). p. 609-615. Includes references. (NAL Call No.: DNAL 79.8 W41).

0125

### Estimating yield and economic returns from replanting corn.

Hawkins, S. Stillwater, Okla. : The Service. OSU extension facts - Cooperative Extension Service, Oklahoma State University. May 1988. (203). 4 p. (NAL Call No.: DNAL S544.3.0505).

0126

### Fall-seeded legume cover crops for no-tillage corn in the humid East.

AGJOAT. Holderbaum, J.F. Decker, A.M.; Meisinger, J.J.; Mulford, F.R.; Vough, L.R. Madison, Wis. : American Society of Agronomy. No-tillage systems utilizing winter cover crops can reduce erosion and leaching losses. Fall-seeded legumes can also supply significant amounts of N to subsequent corn (*Zea mays L.*) crops. The suitability of 14 fall-seeded legumes, three small grains and four legume/grass mixtures was evaluated for winter covers from 1982 through 1985 on Matapeake silt loam (fine-loamy, mixed, mesic, Typic Hapludult) and Mattapex silt (fine-silty, mixed mesic, Aquaflic Normuludult) Coastal Plain soils as well as Delanco silt loam and Chester silt loam (fine-loamy, mixed, mesic, Aquic Hapludult) Piedmont soils. Hairy vetch (*Vicia villosa* Roth), crimson clover (*Trifolium incarnatum* L.) and Austrian winter peas (*Pisum sativum* (L.) Poir. were the most promising cover crops. Fall growth and early soil coverage was highest with crimson and lowest with vetch which had higher winter survival and spring growth. Peas and, to a lesser extent, crimson clover stands were damaged in some years by *Sclerotinia trifoliorum* Eriks. In some years top growth of vetch contained up to 350 kg N/ha. While N concentration varied among species, total N production was determined more by dry matter yield. Legume cover crops had a greater influence on corn grain yields on the heavier textured soils and longer growing season of the Coastal Plain. In 1985, N contribution to the subsequent corn crop was reduced when small grains were seeded with annual legumes. Results from these studies show that winter annual legumes can reduce N costs while providing better soil protection during winter months. *Agronomy journal*. Jan/Feb 1990. v. 82 (1). p. 117-124. Includes references. (NAL Call No.: DNAL 4 AM34P).

0127

### Fertility and weed stress effects on performance of maize/soybean intercrop.

AGJOAT. Weil, R.R. McFadden, M.E. Madison, Wis. : American Society of Agronomy. Intercropped corn (*Zea mays L.*) and soybean *Glycine max* (L.) Merr. may produce more total yield per hectare than either grown separately, i.e., land equivalent ratio (LER) greater than or equal to 1. Low N fertility, limited moisture, and weed competition have each been reported to result in high land equivalent ratios. Thus it was hypothesized that intercropping advantages were greater of soil fertility stress (F1 = low N-P-K, F2 = high N-P-K), weed competition stress (W1 = unweeded, W2 weeded), and four cropping systems (M2S, M1S, M2, S; where M2 = high density maize, M1 = low density maize, and S = soybean at normal density) on the performance of maize and soybean, and on the growth of weeds. 'Cargill 921' maize and 'Union' soybean were planted simultaneously in 1985 and 1986 in alternate rows spaced at 0.5 m on a atypic Hapludult in Maryland. Land equivalent ratios and maize equivalent yields were calculated. Dry matter production was determined early in the season, and grain yield plus weed dry matter were determined at final harvest. LER values (mean of 1985 and 1986) ranged from 0.89 (W1F1M2S) to 1.18 (W2F1M1S). The LER data showed that at high fertility levels, weed stress increased the relative advantage of intercropping. In addition, when plots were weeded, LER increased from 0.96 to 1.13 under fertility stress. Maize equivalent yields were calculated from the relative prices of maize and soybeans. The highest maize equivalent yields in all cropping systems in both years occurred under optimal conditions (W2,F2). *Agronomy journal*. July/Aug 1991. v. 83 (4). p. 717-721. Includes references. (NAL Call No.: DNAL 4 AM34P).

0128

### Field corn: managing pesticides for crop production and water quality protection--a supplement to the IFAS pest control guides.

Hornsby, A.G. Buttler, T.M.; Colvin, D.L.; Sprenkel, R.E.; Dunn, R.A.; Kucharek, T.A. Gainesville, Fla. : The Service. Circular - Florida Cooperative Extension Service. In subseries: Water Quality Initiative Series. May 1991. (982). 10 p. (NAL Call No.: DNAL 275.29 F66C).

0129

### Fusarium ear rot of corn.

CAGRA. Davis, R.M. Kegel, F.R.; Sills, W.M.; Farrar, J.J. Oakland, Calif. : Division of Agriculture and Natural Resources, University of California. California agriculture. Nov/Dec 1989. v. 43 (6). p. 4-5. (NAL Call No.: DNAL 100 C12CAG).

## (PLANT PRODUCTION - FIELD CROPS)

0130

**Glyphosate as harvest aid for corn (*Zea mays*).**  
WETEE9. Alcantara, E.N. Wyse, D.L. Champaign, Ill. : The Society. Weed technology : a journal of the Weed Science Society of America. Oct 1988. v. 2 (4). p. 410-413. Includes references. (NAL Call No.: DNAL SB610.W39).

0131

**Good soil eases drought worries.**  
Kendall, D. Emmaus, Pa. : Regenerative Agriculture Association. The New farm. Nov/Dec 1988. v. 10 (7). p. 44-47. ill. (NAL Call No.: DNAL S1.N32).

0132

**Grain yield, stalk rot, and mineral concentration of fertigated corn as influenced by N P K.**  
JPNUDS. Bullock, D.G. Gascho, G.J.; Sumner, D.R. New York, N.Y. : Marcel Dekker. Journal of plant nutrition. 1990. v. 13 (8). p. 915-937. Includes references. (NAL Call No.: DNAL QK867.J67).

0133

**Harvest management of a crimson clover cover for no-tillage corn production.**  
AGJOAT. Holderbaum, J.F. Decker, A.M.; Meisinger, J.J.; Mulford, F.R.; Vough, L.R. Madison, Wis. : American Society of Agronomy. Legume cover crops are valuable N sources for no-tillage corn (*Zea mays* L.). However, little research has been done in assessing the management options for legume cover crops. Field studies were conducted on a Coastal Plain Matapeake silt loam soil (fine-silty, mixed, mesic Typic Hapludult) from 1983 through 1986 to determine the effects of various harvest management schedules on total N contribution of legume cover crops, subsequent corn grain and silage yields, and total forage (combined cover crop and corn herbage) production. A crimson clover (*Trifolium incarnatum* L.) cover crop was subjected to no harvest; spring silage harvest with clippings removed (spring silage); and simulated pasture harvests with clippings from multiple harvests removed (pasture removed) or returned (pasture returned). A no-cover control treatment was also included. No-tillage corn was grown in the cover crop residues and two fertilizer N (FN) rates (0 and 90 kg ha<sup>-1</sup>) were applied in a split-block design to each harvest management treatment. Averaged over 3 yr, multiple harvests of the cover crop vs. a spring silage harvest resulted in lower cover crop herbage yields (3.0 vs. 4.7 Mg ha<sup>-1</sup>) and total N content (114 vs. 146 kg N ha<sup>-1</sup>) for the multiple harvests. Corn grain and silage yields and corn N uptake were consistently higher following crimson clover cover than for no cover, regardless of harvest management, and were generally higher when the cover was left in place than following removal of the cover.

There were FN responses regardless of harvest management treatment. The reduction in corn silage yield when the cover crop was harvested and removed was less than the cover crop herbage dry matter yield, resulting in greater total forage production when the cover crop was harvested as forage. Results suggest that harvest management options of a crimson clover cover crop offer flexibility in either optimizing subsequent corn grain yields or total forage production for no-tillage cropping. Agronomy journal. Sept/Oct 1990. v. 82 (5). p. 918-923. Includes references. (NAL Call No.: DNAL 4 AM34P).

0134

**Impacts of cropping intensity on carbon and nitrogen mineralization under no-till dryland agroecosystems.**  
AGJOAT. Wood, C.W. Westfall, D.G.; Peterson, G.A.; Burke, I.C. Madison, Wis. : American Society of Agronomy. Imposing no-till and lower fallow frequency on soils previously managed under tilled and frequent fallow systems may alter soil organic C and N concentrations and activity (potential mineralization). This study was conducted to determine the effect of cropping intensity (number of crops/unit time) on surface soil (0-5 cm) C and N activity after 3.5 yr of no-till management. The effect was examined across three soil catenas in the West Central Great Plains that were previously managed under tilled and alternate crop-fallow systems for >50 yr. Production systems included the less intensive wheat (*Triticum aestivum* L.)-fallow (WF), and the more intensive wheat-corn (*Zea mays* L.)-millet (*Panicum miliaceum* L.)-fallow (WCMF). After 3.5 yr of no-till, potential C and N mineralization, C turnover, and relative N mineralization were 61, 39, 36, and 43% greater under WCMF than WF, respectively. Foottlope soils had greater potential C and N mineralization than summit or backslope soils, but lower C turnover and relative N mineralization, which was probably due to long-term accumulation of recalcitrant C and N compounds. Differences in potential soil C and N activity between cropping systems were due to greater surface organic C concentrations under WCMF (mean = 10.88 g kg<sup>-1</sup>) than WF (mean = 9.60 g kg<sup>-1</sup>), which were related to cumulative plant residue additions over the 3.5-yr-study period (mean = 9.01 and 7.04 Mg ha<sup>-1</sup> for WCMF and WF, respectively). It appears that potentially active surface soil organic C and N are very sensitive to change in cultural practices, and are increased by greater cropping intensity under no-till management. Agronomy journal. Nov/Dec 1990. v. 82 (6). p. 1115-1120. Includes references. (NAL Call No.: DNAL 4 AM34P).

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0135

**Incidence of aflatoxin in the 1988 corn crop due to droughtearings before the Subcommittee on Wheat, Soybeans, and Feed Grains of the Committee on Agriculture, House of Representatives, One Hundred First Congress, first and second sessions, April 4, 1989 and April 2, 1990.**

United States.~Congress.~House.~Committee on Agriculture.~Subcommittee on Wheat, Soybeans, and Feed Grains. Washington D.C. : U.S. G.P.O. : For sale by the Supt. of Docs., Congressional Sales Office, U.S. G.P.O., 1990. Distributed to some depository libraries in microfiche.~ "Serial no. 101-8.". iii, 268 p. : ill., maps ; 24 cm. Includes bibliographical references (p. 268). (NAL Call No.: DNAL KF27.A387 1990a).

0136

**Influence of actual and manual black cutworm (Lepidoptera: Noctuidae) damage on recovery and grain yield of field corn.**

JEENAI. Whitford, F. Showers, W.B.; Kaster, L.V. Lanham, Md. : Entomological Society of America. The percentage of recovery and yields of corn plants damaged by black cutworm, *Agrotis ipsilon* (Hufnagel), larvae were compared with manual damage. Significant losses in yield generally occurred before the four-leaf stage (84% of all damaged plants). The recovery of corn seedlings from actual damage and manual damage differed; 1982, 50 and 67%; 1983, 34 and 45%; 1984, 54, and 45%. Often seedlings damaged by black cutworm produced greater yields than did manually damaged plants. The degree of yield reduction depended on the position of the growing point within the plant relative to where the plant had been severed (i.e., above, at, or below the soil surface). Corn plants were much less likely to recover if cut by black cutworm below the soil surface. The possible use of manual cutting in screening corn genotypes for their ability to recover from black cutworm damage is discussed. Journal of economic entomology. Dec 1989. v. 82 (6). p. 1773-1778. Includes references. (NAL Call No.: DNAL 421 J822).

0137

**Influence of cover crop and wheel traffic on soil physical properties in continuous no-till corn.**

SSJD4. Waggoner, M.G. Denton, H.P. Madison, Wis. : The Society. Conservation tillage systems utilizing winter annual cover crops represent a different soil physical environment compared to conventional tillage systems. A field experiment was conducted for 3 yr on a Goldsboro fine sandy loam (fine-loamy, siliceous, thermic Aquic Paleudults) in the North Carolina Coastal Plain to assess effects of cover crop type and row position on soil physical properties under no-tillage corn (*Zea mays* L.) management. Bulk density, soil porosity, and hydraulic conductivity (Ksat) were measured in fallow, winter wheat (*Triticum*

*aestivum* L.), and hairy vetch (*Vicia villosa* Roth.) systems with respect to three row positions (trafficked, untrafficked, and plant row). All traffic was controlled such that each corn row was bordered by a trafficked and untrafficked interrow. In general, soil physical properties were unaffected by cover crop type but strongly influenced by position. Bulk density was significantly higher in the trafficked vs. untrafficked position (1.74 vs. 1.52 Mg m<sup>-3</sup>) after 3 yr and tended to increase with time in the trafficked interrow. Associated with higher bulk density values in the trafficked interrow were significantly lower values for soil porosity and Ksat. Total porosity in the trafficked position, averaged over cover crop type and 3 yr, decreased 21% below that of the untrafficked position. After 3 yr, Ksat was 0.019 and 0.002 mm s<sup>-1</sup> in untrafficked and trafficked interrows, respectively. These results suggest that controlled traffic patterns may be an important component in the management of continuous, conservation tillage systems. Soil Science Society of America journal. July/Aug 1989. v. 53 (4). p. 1206-1210. Includes references. (NAL Call No.: DNAL 56.9 S03).

0138

**Integrating economic analysis with biophysical simulation: appraising Blackland corn production.**

TAEBA. Dillon, C.R. Mjelde, J.W.; McCarl, B.A.; Cothren, J.T.; Martin, J.R.; Rister, M.E.; Stockle, C. College Station, Tex. : The Station. B - Texas Agricultural Experiment Station. Jan 1990. (1654). 51 p. Includes references. (NAL Call No.: DNAL 100 T31S (1)).

0139

**Interaction of corn cultivars with nitrogen rates.**

Russell, W.A. Ames, Iowa : The Service. PM - Iowa State University, Cooperative Extension Service. In the series analytic: Integrated Farm Management Demonstration Program. 1990 Progress Report. Jan 1991. (1417). p. 73-81. (NAL Call No.: DNAL 275.29 I09PA).

0140

**Interaction of three plant-parasitic nematodes on corn and soybean.**

JONEB. Dickson, D.W. McSorley, R. Lake Alfred, Fla. : Society of Nematologists. Journal of nematology. Supplement to the Journal of Nematology (Annals of Applied Nematology). Oct 1990. v. 22 (4S). p. 783-791. Includes references. (NAL Call No.: DNAL QL391.N4J62).

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0141

### Introduction to ridge-tillage for corn and soybeans.

Griffith, D.R. Parsons, S.D.; Mengel, D.B.; Mannerling, J.V.; Childs, D. West Lafayette, Ind. : The Service. Publication I.D. - Cooperative Extension Service, Purdue University. Nov 1989. (180). 8 p. (NAL Call No.: DNAL 275.29 IN2ID).

0142

### Long-term conventional and no-tillage effects on selected soil physical properties.

SSJD4. Hill, R.L. Madison, Wis. : The Society. Soil management systems can affect soil physical properties and, thus, have a direct bearing on crop performance. This study determined the effects of continuous long-term conventional and no-tillage management on selected soil physical properties and compared observed yield differences between these tillage systems with soil physical properties. Three Maryland locations, each having randomized complete-block designs with three replications of continuous corn (*Zea mays L.*) under conventional and no-tillage management, were used. Sites 1 and 2 were in their 12th yr of tillage and Site 3 was in its 11th yr. Soils at all three sites were silt loams (fine-loamy, mixed, Aquic Hapludults). Tillage affected bulk density at the 0.05 level at Site 1 and the 0.10 level at Site 2. No-tilled soils generally had higher bulk density at all soil depths for Sites 1 and 2. Tillage affected soil strength at Sites 1 and 2, but not at Site 3. Soil strength for no-filled soils was consistently greater than for conventionally tilled soils. Conventionally tilled soils had greater pore volume in pores with radii > 15 micrometers at Sites 1 and 2, and, therefore, should drain more readily than no-tilled soils. More importantly, the amount of pore space available for the storage of plant-available water was greater for conventionally-tilled soils at Sites 1 and 2. Although soil physical properties within the Ap horizon are not adequate to account for differences in corn yield response, tillage differences in soil physical properties were found for the soils at Sites 1 and 2, which had previously shown tillage yield differences. Soil Science Society of America journal. Jan/Feb 1990. v. 54 (1). p. 161-166. Includes references. (NAL Call No.: DNAL 56.9 S03).

0143

### Low-input practices.

Daberkow, S. Hansen, L.; Vroomen, H. Washington, D.C. : The Service. Agricultural outlook AO - U.S. Department of Agriculture, Economic Research Service. Dec 1988. (148). p. 23-25. ill. (NAL Call No.: DNAL aHD1751.A42).

0144

### Lysimeter study of nitrogen fertilizer and irrigation rates on quality of recharge water and corn yield.

JEVQAA. Prunty, L. Montgomery; B.R. Madison, Wis. : American Society of Agronomy. Accrual of NO<sub>3</sub>-N to groundwater as a result of agricultural practices is a focus of environmental concern. This inquiry was conducted to quantify precisely in a replicated experiment the rate of N loading to groundwater resulting from inputs of N and irrigation water to corn (*Zea mays L.*). Input levels were designed to balance potential for high production with minimum loading of NO<sub>3</sub>-N to groundwater. Four large (2.4 by 2.4 m and 2.3 m deep) drainage lysimeters with reconstructed Hecla loamy fine sand (Aquin Haploborolls) were employed in this southeast North Dakota study. Grain yields at N fertilizer rates of 95 and 145 kg/ha were 10.3 and 11.3 Mg/ha, respectively. Differences in yield due to irrigation and irrigation by N interaction were nonsignificant. There was no residual effect of N fertilizers on yield. The higher irrigation rate caused increases in drainage of water within about 30 d. The higher rate of N fertilizer, however, was not reflected by increased concentration of NO<sub>3</sub>-N in the drainage water until 325 d after application. The increased concentrations then persisted to 500 d. Flow-weighted means of N concentrations for this period were 8.6 and 12.3 mg/L for the low and high N rates, respectively. For this soil and climate, irrigation and N management can be tailored to produce NO<sub>3</sub>-N concentrations below 10 mg/L with continuous corn. However, the 5:1 economic return produced by 50 kg/ha of incremental N fertilizer means that producers are unlikely to adopt the needed practices without incentives. Journal of environmental quality. Apr/June 1991. v. 20 (2). p. 373-380. Includes references. (NAL Call No.: DNAL QH540.J6).

0145

### Management effects on kernel breakage susceptibility of early maturing corn hybrids.

AGJOAT. Moes, J. Vyn, T.J. Madison, Wis. : American Society of Agronomy. Agronomy journal. July/Aug 1988. v. 80 (4). p. 699-704. Includes references. (NAL Call No.: DNAL 4 AM34P).

0146

### Managing slowly permeable soils for tobacco and corn production in Kentucky.

Wells, K.L. Phillips, R.L. Lexington, Ky. : The Service. AGR - University of Kentucky, Cooperative Extension Service. Jan 1990. (143). 4 p. (NAL Call No.: DNAL S65.K4).

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0147

**Minimum tillage corn (*Zea mays*) and sorghum (*Sorghum bicolor*) silage production in southeast Louisiana.**

LAXBA. Morris, D.R. Joost, R.E.; Friesner, D.L.; Allen, M.; Brady, R.; Jodari, F.; Parish, R.; Mason, L.F. Baton Rouge, La. : The Station. Bulletin - Louisiana Agricultural Experiment Station. Nov 1989. (817). 31 p. Includes references. (NAL Call No.: DNAL 100 L93 (1)).

0148

**Modeling the effect of shattercane on corn growth and yield.**

AAEPC. Retta, A. Vanderlip, R.L.; Moshier, L.J.; Machtmes, K.; Higgins, R.A. St. Joseph, Mich. : The Society. Paper - American Society of Agricultural Engineers. Paper written for presentation at the 1989 International Summer Meeting American Society of Agricultural Engineering and the Canadian Society of Agricultural Engineering, June 25-28, 1989, Quebec Canada. Summer 1989. (89-4041). 8 p. Includes references. (NAL Call No.: DNAL 290.9 AM32P).

0149

**New soil test cuts N rates 62%: could save money and protect groundwater throughout Corn Belt.**

Cramer, C. Emmaus, Pa. : Regenerative Agriculture Association. The New farm. Mar/Apr 1990. v. 12 (3). p. 9-10. (NAL Call No.: DNAL S1.N32).

0150

**Nitrogen balance and biomass production of newly established no-till dryland agroecosystems.**

AGUOAT. Wood, C.W. Peterson, G.A.; Westfall, D.G.; Cole, C.V.; Willis, W.O. Madison, Wis. : American Society of Agronomy. Soil-crop management affects the soil-N balance and, thus, has a direct bearing on soil productivity. This study determined the effects of cropping intensity (crops/time) under no-till and grassland establishment on aboveground biomass production and the system-N balance after 4 yr (1985-1989). The effects were examined across toposequences in the West Central Great Plains that had been tilled and frequently fallowed > 50 yr. Production systems included wheat (*Triticum aestivum* L.)--fallow (WF), wheat-corn (*Zea mays* L.) or sorghum (*Sorghum vulgare* L.)--millet (*Panicum miliaceum* L.)--fallow (WCMF), and perennial grass (CG). Inter-agronomic systems (WCMF) had greater above ground production, greater N uptake, and greater percent plant residue retention than WF. Continuous grass systems had less aboveground production and N uptake but greater percent plant residue retention than agronomic systems. Soil-profile NO<sub>3</sub>-N was lower under WCMF systems than WF systems, but organic

N showed the opposite trend implying that more intense systems are at less risk for NO<sub>3</sub>-N leaching, and have greater potential for replenishment of soil-organic N via enhanced immobilization. Aboveground biomass production and plant residue production increased downslope, but slope position had little effect on plant-N uptake, plant residue retention, or soil-N dynamics. Imposing no-till and perennial grassland systems created a N-balance disequilibrium, but more time will be required to ascertain the trajectory of N loss or gain due to establishment of no-till or grassland management on these soils. Agronomy journal. May/June 1991. v. 83 (3). p. 519-526. Includes references. (NAL Call No.: DNAL 4 AM34P).

0151

**Nitrogen fertilization in ridge-till corn to reduce nitrate leaching and increase nitrogen use efficiency.**

Cruse, R.M. Kohler, K.A. Ames, Iowa : The Service. PM - Iowa State University, Cooperative Extension Service. In the series analytic: Integrated Farm Management Demonstration Program. 1990 Progress Report. Jan 1991. (1417). p. 23-24. (NAL Call No.: DNAL 275.29 I09PA).

0152

**Nitrogen management related to groundwater quality in Minnesota.**

JMNAA. Anderson, J.L. Malzer, G.L.; Randall, G.W.; Rehm, G.W. St. Paul, Minn. : The Academy. Journal of the Minnesota Academy of Science. Fall 1989. v. 55 (1). p. 53-57. maps. Includes references. (NAL Call No.: DNAL 500 M663).

0153

**Nitrogen source, rate, and application method for no-tillage corn.**

SSSJD4. Howard, D.D. Tyler, D.D. Madison, Wis. : The Society. Surface applying urea-containing N fertilizers may result in greater N losses by volatilization of NH<sub>3</sub> as urea hydrolyses than nonurea containing materials. The objective of this study was to evaluate the N efficiency of urea-ammonium nitrate (UAN), urea and urea-urea phosphate (UUP) at 56, 112, 168, and 224 kg ha<sup>-1</sup> N rates applied broadcast, surface banded, and injected for no-till corn (*Zea mays* L.). Yield, ear-leaf N concentration, and N uptake were used to estimate N availability. Broadcast ammonium nitrate (AN) and injected anhydrous ammonia (AA) were used as controls for evaluating N efficiency of urea-containing N sources and their application methods. The method of applying the urea-containing N sources has a significant effect on apparent N fertilizer availability. Injecting UAN and urea resulted in significantly higher yield, leaf N concentration, and N uptake when compared with broadcast and surface band application methods. Surface banding UAN at 168 and 224 kg ha<sup>-1</sup> resulted in higher yields than urea or UUP.

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Yield, leaf N concentration and N uptake differences among the three urea-containing N sources were not observed when broadcast applied. Broadcasting AN at 168 and 224 kg ha<sup>-1</sup> resulted in higher yields than UAN, urea or UUP. Injecting the N sources resulted in higher yields when compared with broadcasting AN. Soil Science Society of America journal. Sept/Oct 1989. v. 53 (5). p. 1573-1577. Includes references. (NAL Call No.: DNAL 56.9 S03).

0154

### No-till corn production in a living mulch system.

WETEE9. Echtenkamp, G.W. Moomaw, R.S. Champaign, Ill. : The Society. Weed technology : a journal of the Weed Science Society of America. Apr/June 1989. v. 3 (2). p. 261-266. Includes references. (NAL Call No.: DNAL SB610.W39).

0155

### Optimum time(s) of nitrogen application to improve nitrogen use efficiency and reduce leaching.

Amos, F.B. Jr. Baker, J.L.; Timmons, D.R.; Kanwar, R.S. Ames, Iowa : The Service. PM - Iowa State University, Cooperative Extension Service. In the series analytic: Integrated Farm Management Demonstration Program. 1990 Progress Report. Jan 1991. (1417). p. 35-39. (NAL Call No.: DNAL 275.29 I09PA).

0156

### Perennial vine competition and control.

MAEBB. Elmore, C.D. Heatherly, L.G.; Wesley, R.A. Mississippi State, Miss. : The Station. Bulletin - Mississippi Agricultural and Forestry Experiment Station. Oct 1989. (964). 6 p. ill. Includes references. (NAL Call No.: DNAL S79.E3).

0157

### Perennial vine control in multiple cropping systems on a clay soil.

WETEE9. Elmore, C.D. Heatherly, L.G.; Wesley, R.A. Champaign, Ill. : The Society. Weed technology : a journal of the Weed Science Society of America. Apr/June 1989. v. 3 (2). p. 282-287. Includes references. (NAL Call No.: DNAL SB610.W39).

0158

### Performance of corn hybrids grown in a virus disease environment.

TFHSA. West, D.R. Kincer, D.R.; Graves, C.R.; Reddick, B.B. Knoxville, Tenn. : The Station. Tennessee farm and home science : progress report - Tennessee Agricultural Experiment

Station. Summer 1988. (147). p. 20-23. ill. Includes references. (NAL Call No.: DNAL 100 T25F).

0159

### Performance of field corn hybrids in South Carolina, 1988.

McClain, E.F. Zublena, J.P.; Barefield, D.K.; Chrestman, R.E. Clemson, S.C. : The Service. Circular - Clemson University, Cooperative Extension Service. Includes statistical data. Dec 1988. (193,rev.). p. 47 p. maps. (NAL Call No.: DNAL 275.29 S08E).

0160

### Preplant irrigation in the Central and Southern High Plains--a review.

TAAEA. Musick, J.T. Lamm, F.R. St. Joseph, Mich. : American Society of Agricultural Engineers. Preplant irrigation has been widely practiced in the semi-arid High Plains since the early expansion of pump irrigation from the Ogallala Aquifer in the late 1930s. As groundwater storage continues to decline, the common practice of "heavy" water application to fully wet the root zone of graded furrow fields prior to planting is being questioned. Under some conditions, preplant irrigation is an essential practice for timely stand establishment and high yields. However, in many situations, the large application depths required for surface irrigation result in inefficient soil water storage and low yield response. With center pivot sprinkler systems, smaller and more precise preplant irrigation application amounts are possible resulting in more efficient preseason storage. We conclude that the benefits of preplant irrigation are likely to be greatest (1) when the soil profile is dry before planting; (2) when seasonal irrigations are not applied to drought-tolerant crops or are reduced in amount; (3) when early planting limits soil wetting by precipitation by the desired date; and (4) when preplant irrigation plus seasonal precipitation on deep, high water storage soils can result in moderately high irrigated yields without seasonal irrigation. The benefits are likely to be low (1) when soil profiles are moderately wet at time of irrigation; (2) when planting dates are flexible and can follow precipitation events for stand establishment; and (3) when seasonal irrigation provides adequate water to meet plant requirements. As groundwater decline continues and precipitation becomes more important for supplying crop water requirements, the use of preplant irrigation as an irrigation water management practice will likely decline in importance in the High Plains. Transactions of the ASAE. Literature review. Nov/Dec 1990. v. 33 (6). p. 1834-1842. Includes references. (NAL Call No.: DNAL 290.9 AM32T).

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0161

**Projected costs and returns -- cotton, soybeans, corn, milo and wheat, northeast Louisiana, 1990.**

Paxton, K.W. Lavergne, D.R. Baton Rouge, La. : The Station. A.E.A. information series - Louisiana Agricultural Experiment Station. Jan 1990. (78). p. A-1--A-66. (NAL Call No.: DNAL S67.E2).

0162

**Projected costs and returns--cotton, soybeans, corn, milo and wheat, northeast Louisiana, 1989.**

Paxton, K.W. Lavergne, D.R. Baton Rouge, La. : The Station. A.E.A. information series - Louisiana Agricultural Experiment Station. In the series analytic: Projected costs and returns and cash flows from major agricultural enterprises, Louisiana, 1989.~ Includes statistical data. Jan 1989. (70-76). p. A1-A62. (NAL Call No.: DNAL S67.E2).

0163

**Projected costs and returns--cotton, soybeans, corn, milo and wheat, Red River and Central Areas, Louisiana, 1990.**

Lavergne, D.R. Paxton, K.W. Baton Rouge, La. : The Station. A.E.A. information series - Louisiana Agricultural Experiment Station. Jan 1990. (79). p. B-1--B-40. (NAL Call No.: DNAL S67.E2).

0164

**Projected costs and returns--cotton, soybeans, corn, milo and wheat, Red River and Central Areas, Louisiana, 1989.**

Lavergne, D.R. Paxton, K.W. Baton Rouge, La. : The Station. A.E.A. information series - Louisiana Agricultural Experiment Station. In the series analytic: Projected costs and returns and cash flows from major agricultural enterprises, Louisiana, 1989.~ Includes statistical data. Jan 1989. (70-76). p. B1-B35. (NAL Call No.: DNAL S67.E2).

0165

**Projected costs and returns--soybeans, corn, milo, wheat, wheat-soybean double crop, and rice-crawfish double crop, Southwest Louisiana, 1990.**

McManus, B. Heagler, A. Baton Rouge, La. : The Station. A.E.A. information series - Louisiana Agricultural Experiment Station. Jan 1990. (80). p. C-1--C-81. (NAL Call No.: DNAL S67.E2).

0166

**Projected costs and returns--soybeans, corn, milo, wheat, wheat-soybean double crop, and rice-crawfish double crop, Southwest Louisiana, 1989.**

McManus, B. Zacharias, T. Baton Rouge, La. : The Station. A.E.A. information series - Louisiana Agricultural Experiment Station. In the series analytic: Projected costs and returns and cash flows from major agricultural enterprises, Louisiana, 1989.~ Includes statistical data. Jan 1989. (70-76). p. C1-C79. (NAL Call No.: DNAL S67.E2).

0167

**Projected costs and returns: cotton, soybeans, corn, milo and wheat, Northeast Louisiana, 1992.**

Paxton, K.W. Lavergne, D.R. Baton Rouge, La. : The Station. A.E.A. information series - Louisiana Agricultural Experiment Station. In the series analytic: Projected costs and returns and cash flows for major agricultural enterprises, Louisiana, 1992. Jan 1992. (99). p. A-1/A-72. (NAL Call No.: DNAL S67.E2).

0168

**Projected costs and returns: cotton, soybeans, corn, milo and wheat, Red River and Central Areas, Louisiana, 1992.**

Lavergne, D.R. Paxton, K.W. Baton Rouge, La. : The Station. A.E.A. information series - Louisiana Agricultural Experiment Station. In the series analytic: Projected costs and returns and cash flows for major agricultural enterprises, Louisiana, 1992. Jan 1992. (100). p. B-1/B-44. (NAL Call No.: DNAL S67.E2).

0169

**Projected costs and returns: rice, soybeans, corn, milo, wheat, wheat-soybean double crop, crawfish, rice-crawfish double crop--Louisiana, 1992.**

Giesler, G. Heagler, A.; Baldridge, T.; Huffman, D.; Dellenbarger, L. Baton Rouge, La. : The Station. A.E.A. information series - Louisiana Agricultural Experiment Station. In the series analytic: Projected costs and returns and cash flows for major agricultural enterprises, Louisiana, 1992. Jan 1992. (101). p. C-1/C-90. (NAL Call No.: DNAL S67.E2).

0170

**The protection of corn, November 1984 - April 1988 citations from AGRICOLA concerning diseases and other environmental considerations /compiled and edited by Charles N. Bebee.**

Bebee, Charles N. Beltsville, Md. : U.S. Dept. of Agriculture, National Agricultural Library ; Washington, D.C. : U.S. Environmental Protection Agency, Office of Pesticide

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Programs, 1988. "September 1988."~ Includes index. 243 p. ; 28 cm. (NAL Call No.: DNAL AZ5076.A1U54 no.69).

0171

**Reducing nitrogen applications to manured corn an opportunity to save money and protect the environment /Thomas Legg ... et al..**  
Legg, Thomas D. St. Paul, Minn. : Dept. of Agricultural and Applied Economics, University of Minnesota, 1990 . "March 1990." . 24, 36 leaves : charts ; 28 cm. Includes bibliographical references. (NAL Call No.: DNAL HD1761.A1M5 no.90-28).

0172

**Relationship of plant phenology to corn yield loss resulting from western corn rootworm (Coleoptera: Chrysomelidae) larval injury, nitrogen deficiency, and high plant density.**  
JEENAI. Spike, B.P. Tollefson, J.J. Lanham, Md. : Entomological Society of America.  
Relationships among stresses caused by nitrogen deficiency, high plant population levels, and western corn rootworm (WCR) (*Diabrotica virgifera virgifera* LeConte) injury and their effects on phenological development and grain yield of corn (*Zea mays L.*) were determined in a 2-yr field study. WCR infestation did not significantly affect silk development in 1984, although yields were 88.8 and 80.6% of those of the control at densities of 600 and 1,200 eggs per 30.5-cm row, respectively. Effects from root injury appeared to be compounded by moisture-stressed conditions in 1985, and asynchrony between tassel and silk development resulted in increased plant barrenness. Grain yields in 1985 were 80.2 and 55.6% of those of undamaged plants at the 600- and 1,200-egg infestation levels. Evidence from plant density by rootworm interaction on silking interval, barrenness, and yields suggests that the corn plant can tolerate a certain amount of root damage when plant densities are low. A significant nitrogen by rootworm interaction on grain yields provided evidence that root injury interferes with nitrogen uptake. The disruption of phenology of the injured corn plants appeared to be the result of decreased plant turgor resulting from WCR feeding. Journal of economic entomology. Feb 1989. v. 82 (1). p. 226-231. Includes references. (NAL Call No.: DNAL 421 J822).

0173

**Relationship of root ratings, root size, and root regrowth to yield of corn injured by western corn rootworm (Coleoptera: Chrysomelidae).**  
JEENAI. Spike, B.P. Tollefson, J.J. Lanham, Md. : Entomological Society of America. Root damage ratings are a major method of assessing larval injury to corn roots by corn rootworms. This 2-yr study was conducted to examine the relationships between root ratings, root size,

root regrowth, and grain yield. Treatments included several nitrogen, plant density, and western corn rootworm infestation levels. Root ratings were not consistent predictors of yield over both years of this study. Yields of plants having root injury were highly variable when agronomic and environmental conditions were favorable for plant growth. Root biomass was a more consistent predictor of grain yield with R<sup>2</sup> of 0.52 and 0.61 in 1984 and 1985, respectively. Root growth (regrowth in infested plants) was quantified in 1985 by subtracting root weights in early July from average weights sampled after regrowth had occurred. During this time period, root growth of noninfested plants was not statistically different than regrowth of infested plants. The interaction between infestation and nitrogen was significant, which indicated that regrowth of damaged roots increased greatly with the application of nitrogen. Regrowth of injured roots also was enhanced in the moderate plant density (63,000 plants per ha) treatment. Grain yields were related to regrowth of injured plants (R<sup>2</sup> of 0.65 and 0.60 at the moderate and high infestation levels, respectively). These results suggest that an index for regrowth should be used when relating root damage to grain yield. Journal of economic entomology. Dec 1989. v. 82 (6). p. 1760-1763. Includes references. (NAL Call No.: DNAL 421 J822).

0174

**Reseeding potential of crimson clover as a cover crop for no-tillage corn.**  
AGJOAT. Myers, J.L. Waggoner, M.G. Madison, Wis. : American Society of Agronomy. Leguminous cover crops can provide biologically fixed N to a subsequent corn (*Zea mays L.*) crop as well as erosion control and moisture conserving mulch, but establishment is costly and often unsuccessful. A field experiment was conducted for 3 yr to determine the self-reseeding potential of crimson clover (*Trifolium incarnatum L.*) and its N contribution in a no-tillage corn production system. Four cover crop management treatments (fallow, annual-seeded, volunteer-reseeded, and volunteer strip-reseeded) were combined factorially with four fertilizer-N rates (0, 50, 100, or 150 kg ha<sup>-1</sup>) applied to the subsequent corn crop. The annual-seeded, volunteer-reseeded, and volunteer strip-reseeded clover treatments were desiccated at corn planting. Averaged over 3 yr, crimson clover dry matter was 2.6, 4.2, and 3.5 Mg ha<sup>-1</sup> for the annual-seeded, volunteer-reseeded, and strip-reseeded treatments, respectively. In 1988 and 1989, cover crop treatments produced mean corn grain yields of 6.0 and 6.1 Mg ha<sup>-1</sup> compared to fallow treatment yields of 3.4 and 4.0 Mg ha<sup>-1</sup>, respectively. This same pattern was reflected in the silage yields and total corn N uptake. Corn grain yields were unaffected by fertilizer-N rate in two out of 3 yr due to limited rainfall. Both self-reseeding treatments successfully reestablished each year and increased corn yields primarily by a mulching effect. Allowing crimson clover to mature before chemical desiccation or leaving

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strips between corn rows to produce seed appear to be effective methods of reseeding clover in a no-tillage corn silage production system. Agronomy journal. Nov/Dec 1991. v. 83 (6). p. 985-991. Includes references. (NAL Call No.: DNAL 4 AM34P).

0175

### Response of corn hybrids to nitrogen management and environment.

Anderson, I.C. Ames, Iowa : The Service. PM - Iowa State University, Cooperative Extension Service. In the series analytic: Integrated Farm Management Demonstration Program. 1990 Progress Report. Jan 1991. (1417). p. 69-72. Includes references. (NAL Call No.: DNAL 275.29 ID9PA).

0176

### Risk and sustainable agriculture: a target-MDTAD analysis of the 92-year "old rotation".

Novak, J.L. Mitchell, C.C. Jr.; Crews, J.R. Experiment, Ga. : The Association. Target-MDTAD was used to assess the risks and returns of sustainable cotton crop rotations from Auburn University's 92-year "Old Rotation." Study results analyze rotations of continuous cotton, with and without winter legumes; two years of cotton-winter legumes-corn, with and without nitrogen fertilization; and three years of cotton-winter legumes-corn and rye-soybeans double-cropped. Ten years of observations on deviations from target income were used to identify optimal sustainable rotation(s). Study results suggest that diversification in rotations, as well as in crops, results in the least risk for a given level of target income. Southern Journal of Agricultural Economics - Southern Agricultural Economics Association. July 1990. v. 22 (1). p. 145-153. Includes references. (NAL Call No.: DNAL HD101.S6).

0177

### Rotational cropping sequence affects yield of corn and soybean.

AGJOAT. Crookston, R.K. Kurle, J.E.; Copeland, P.J.; Ford, J.H.; Lueschen, W.E. Madison, Wis. : American Society of Agronomy. There are numerous reports of the beneficial effects of rotating corn (*Zea mays* L.) and soybean *Glycine max* (L.) Merr. However, few studies have been specifically designed to document the important corn-soybean rotation effect. The objective of this study was to determine the impact of various corn and soybean cropping patterns on the yield of both crops. The 9-year field study conducted at two locations was managed for maximum production. Cropping sequences consisted of: continuous monoculture with the same cultivar; continuous monoculture with cultivars alternated; annual rotation of the two crops; and 1, 2, 3, 4, and 5 yr of monoculture following 5 yr of the other crop. Annually rotated corn yielded 10% better, and

first-year corn yielded 15% better than corn under monoculture. Annually rotated soybean yielded 8% better, and first year soybean yielded 17% better than soybean under monoculture. With monoculture of either crop, alternating two different cultivars annually resulted in the same yield as continuous cropping of just one cultivar. There were differences in the response of the two crops to increasing years of monoculture: the lowest corn yield was from second year corn; the lowest soybean yield was from extended monoculture. Total corn dry weight was affected by cropping sequence but soybean dry weight was not. Our data suggest that, from a yield standpoint a superior cropping sequence for Minnesota would include at least three, and possibly more crops. Agronomy journal. Jan/Feb 1991. v. 83 (1). p. 108-113. Includes references. (NAL Call No.: DNAL 4 AM34P).

0178

### Simulating physical processes and economic behavior in saline, irrigated agriculture: model development.

WRERAO. Lefkoff, L.J. Gorelick, S.M. Washington, D.C. : American Geophysical Union. A model of an irrigated, saline stream-aquifer system is constructed to simulate economic, agronomic, and hydrologic processes. The model is applied to a section of the Arkansas Valley in southeastern Colorado and is used to examine the effect of crop-mixing strategies on long-term profits. Mixing in excess of crop rotation requirements provides an index of farmers' willingness to exchange some profit for a reduction in the risk of short-term loss. The model contains three components. The economic component simulates water use decisions that maximize annual profit for each farm. The hydrologic component simulates salt transport by employing regression equations that predict changes in groundwater salinity as a function of hydrologic conditions and water use decisions. The agronomic component approximates changes in corn and alfalfa production in response to the depth and salinity of irrigation applications. Results from the entire economic-hydrologic-agronomic model are consistent with the few historical observations available for the site. Water resources research. July 1990. v. 26 (7). p. 1359-1369. maps. Includes references. (NAL Call No.: DNAL 292.8 W295).

0179

Soil erosion has limited effect on field scale crop productivity in the southern Piedmont. SSSJD4. Daniels, R.B. Gilliam, J.W.; Cassel, D.K.; Nelson, L.A. Madison, Wis. : The Society. Many studies show that slightly eroded soils outyield severely eroded soils. We believe the yield differences between slightly and severely eroded soils is in part a misinterpretation of the data based on the assumption that all parts of a field were equally productive before man-induced erosion began. The purpose of this study was to quantify the effects of surface

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horizon variability on the productivity of a soil map unit. Yield data from farmer-managed Piedmont fields show that all parts of a field or soil map unit are not equally productive, regardless of erosion class. When yields are compared across erosion classes by landscape position, slightly eroded soils usually outyield severely eroded soils, but the differences are small. Because the area of severely eroded soils in most fields is small, their impact on field production is slight. Our analysis shows that when landscape position and erosion class variables are combined with the area of each, the average economic loss resulting from lower crop yields of eroded Piedmont soils is only \$4.44 ha<sup>-1</sup> yr<sup>-1</sup> at 1987 prices. Soil Science Society of America journal. May/June 1989. v. 53 (3). p. 917-920. ill. Includes references. (NAL Call No.: DNAL 56.9 S03).

0180

### Sprinkler irrigation management for corn--southern great plains.

Howell, T.A. Copeland, K.S.; Schneider, A.D.; Dusek, D.A. St. Joseph, Mich. : The Society. American Society of Agricultural Engineers (Microfiche collection). Paper presented at the 1988 Summer Meeting of the American Society of Agricultural Engineers. Available for purchase from: The American Society of Agricultural Engineers, Order Dept., 2950 Niles Road, St. Joseph, Michigan 49085. Telephone the Order Dept. at (616) 429-0300 for information and prices. 1988. (fiche no. 88-2098). 21 p. ill. Includes references. (NAL Call No.: DNAL FICHE S-72).

0181

### Systems approach to weed management in irrigated crops.

WEESA6. Schweizer, E.E. Lybecker, D.W.; Zimdahl, R.L. Champaign, Ill. : Weed Science Society of America. The impact of four weed management systems on weed seed reserves in soil, yearly weed problem, and production of barley, corn, pinto bean, and sugarbeet was assessed where these crops were grown in rotation for 4 consecutive years in four cropping sequences. Weeds were controlled in each crop with only conventional tillage or conventional tillage plus minimum, moderate (system 1), and intensive (system 2) levels of herbicides. Seed of annual weeds from 11 genera were identified, with barynyardgrass and redroot pigweed comprising 66 and 19%, respectively, of the initial 90 million weed seed/ha present in the upper 25 cm of the soil profile. After the fourth cropping year, overall decline in the total number of weed seed in soil was 53% when averaged over four cropping sequences and four weed management systems. Over the 4-yr period, about 10 times more weeds escaped control in system 1 than in system 2; and within a crop, the fewest number of weeds escaped control annually in barley. System 2 had the higher herbicide use in each cropping sequence, the fewest weeds at harvest,

and the smallest adjusted gross return over the 4-yr period in three of four cropping sequences. Weed science. Nov 1988. v. 36 (6). p. 840-845. Includes references. (NAL Call No.: DNAL 79.8 W41).

0182

### Take the suspense out of the season.

Smith, D. Philadelphia, Pa. : The Journal. Farm journal. Mid Jan 1989. v. 113 (2). p. 18-19. ill. (NAL Call No.: DNAL 6 F2212).

0183

### Tillage alternatives for alfalfa to corn rotation.

Shinners, K.J. Nelson, W.S. St. Joseph, Mich. : The Society. American Society of Agricultural Engineers (Microfiche collection). Paper presented at the 1988 Winter Meeting of the American Society of Agricultural Engineers. Available for purchase from: The American Society of Agricultural Engineers, Order Dept., 2950 Niles Road, St. Joseph, Michigan 49085. Telephone the Order Dept. at (616) 429-0300 for information and prices. 1988. (fiche no. 88-1566). 23 p. Includes references. (NAL Call No.: DNAL FICHE S-72).

0184

### Tillage and cover crop management for soil water conservation.

AGUOAT. Munawar, A. Blevins, R.L.; Frye, W.W.; Saul, M.R. Madison, Wis. : American Society of Agronomy. The effectiveness of a conservation tillage system depends on the amount and distribution of plant residues left on the soil surface. We determined effects of tillage systems, N fertilizer rates, and cover crop management on soil temperature, soil moisture, and corn (*Zea mays L.*) yields. Tillage treatments were chisel-plow tillage, conventional tillage (moldboard plowing and disk) disk tillage, and no-tillage Nitrogen fertilizer at rates of 0, 75, 150, or 225 kg N ha<sup>-1</sup> were broadcast on the soil surface. Rye (*Secale cereale L.*) on one-half of each split plot was killed 3 wk before corn planting time, while the other half was allowed to grow until the corn was planted. Corn yields in 1986 were 4.41, 4.03, 3.64, and 2.25 Mg ha<sup>-1</sup> for no-tillage, chisel-plow tillage, disk tillage, and conventional tillage, respectively. The yields were significantly greater with early killed rye (3.85 and 5.05 Mg ha<sup>-1</sup> in 1986 and 1987, respectively) than with late-killed rye (3.32 and 4.58 Mg ha<sup>-1</sup> in 1986 and 1987, respectively). Soil temperature tended to be slightly higher under the late-killed rye mulch in 1986 with no significant difference in 1985. Soil moisture content was significantly higher for early killed rye treatment in the early part of the season in 1986 because there was less soil moisture depletion due to the growing rye. Agronomy journal. July/Aug 1990. v. 82 (4). p. 773-777. Includes references. (NAL Call

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No.: DNAL 4 AM34P).

0185

## Tillage and planting system effects on corn emergence from Norfolk loamy sand.

AAREEZ. Karlen, D.L. New York, N.Y. : Springer. Nonuniform emergence and slow, early season growth of corn (*Zea mays L.*) have been consistent problems for conservation tillage (CT) in southeastern Coastal Plain. Low soil temperature often causes similar problems in the Corn Belt, but previous research showed that it was not the problem. The effects of preplant tillage and various CT planting systems on seedbed water content and corn emergence were measured in one laboratory and five field studies that were conducted on Norfolk (Typic Paludult) loamy sand. Seedbed water content and seedling emergence were measured frequently after planting. Without prior disking to kill winter weeds, seedbed water content was significantly lower in three of five studies, and seedling emergence was slower in four studies. The laboratory experiment confirmed that emergence was slower when seedbed water content was less than 50 g/kg (5%). Applying irrigation water within 24 hours after planting increased emergence from CT treatments in one study, but decreased it in another because of surface crusting. Using in-row subsoil planting systems that prepare good seedbed conditions, and planters designed for rough seedbeds improved seedling emergence in CT treatments. Results show that factors affecting seedbed water content can explain emergence and stand establishment problems better than soil temperature for CT systems on sandy Coastal Plain soils. Applied agricultural research. Summer 1989. v. 4 (3). p. 190-195. Includes references. (NAL Call No.: DNAL S539.5.A77).

0186

Tillage effects on nutrient losses  
JEVQAA. Bins P.L.; Robeson Society of Agric nonpoint-sourc becomes more ev attention is foc on the effects of agricultural practices on soil erosion and water quality. Tillage systems are known to affect the amount of water moving over the surface and through the soil. This study compared the contributions of three tillage systems used in corn (*Zea mays L.*) production with (i) sediment losses and surface runoff and (ii) the potential for nonpoint-source surface water pollution from N and P fertilizers and triazine herbicides. Tillage treatments were no-tillage, chisel-plow tillage, and conventional tillage (moldboard plow plus secondary tillage). The study site was on a Maury silt loam (Typic Paleudalfs). Over the 4-yr period, conventional tillage runoff volume was 576.7 kL ha<sup>-1</sup>, chisel-plow 205.7 kL ha<sup>-1</sup>, and no-tillage 239.9 kL ha<sup>-1</sup>. Total soil loss

from conventional tillage was 19.79 Mg ha<sup>-1</sup>, chisel plow 0.71 Mg ha<sup>-1</sup>, and no-tillage 0.55 Mg ha<sup>-1</sup>. Amounts of NO<sub>3</sub>(-), soluble P, and atrazine leaving the plots in surface runoff were greatest from conventional tillage and about equal from chisel-plow and no-tillage. The magnitudes of the losses in surface runoff water were small for all chemicals measured. Journal of environmental quality. Oct/Dec 1990. v. 19 (4). p. 683-686. Includes references. (NAL Call No.: DNAL QH540.J6).

0187

## Tillage system effects on crop growth and production costs for a corn-soybean rotation.

JPRAEN. Brown, H.J. Cruse, R.M.; Colvin, T.S. Madison, Wis. : American Society of Agronomy. Journal of production agriculture. July/Sept 1989. v. 2 (3). p. 273-279. Includes references. (NAL Call No.: DNAL S539.5.J68).

0188

## A timeliness model for corn planting.

AAEPC. Keener, H.M. Holmes, R.G.; Gliem, J.A. St. Joseph, Mich. : The Society. Paper - American Society of Agricultural Engineers. Paper presented at the 1989 International Summer Meeting, June 25-28, 1989, Quebec, PQ, Canada. Summer 1989. (89-1023). 17 p. Includes references. (NAL Call No.: DNAL 290.9 AM32P).

0189

## Use of spectral vegetation indices to infer leaf area, evapotranspiration and yield. II. Results.

AGJOAT. Wiegand, C.L. Richardson, A.J. Madison, Wis. : American Society of Agronomy. Better methods of interpreting spectral observations of crop canopies in terms of agronomic characteristics such as green leaf area index (L) and aboveground dry phytomass (DM), and for estimating economic yield (Y) are needed. The equations proposed were applied to single year experiments with *Triticum aestivum L.* and *Triticum durum Desf.*, *Gossypium hirsutum L.*, and *Zea mays L.* in order to illustrate and further test them. As predicted fractional photosynthetically active radiation absorption (FPAR) could be estimated from vegetation indices (VI) such as perpendicular vegetation index (PVI) and the normalized difference (ND) about as well as from L. Generally, L/VI and FPAR/L verbalized as L as a function of VI, and FPAR as a function of L were exponential relations whereas FPAR/VI were linear or nearly linear functions. The DM, Y, and the harvest index (Y/DM) were linearly related to PVI averaged for several dates during late vegetative development for wheat and corn, indicating that relative yields for both crops had been set by that development stage. The functional relations L/VI, FPAR/L, FPAR/VI, Y/VI, DM/VI, sigma APAR/sigma VI, DM/sigma APAR, Y/sigma VI and (Y/DM)/VI where APAR is daily absorbed PAR (MJ m<sup>-2</sup> d<sup>-1</sup>) presented

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document that direct spectral observations and the equations incorporating them do provide additional analytical tools for interpreting crop development, growth, and yield. *Agronomy journal*. May/June 1990. v. 82 (3). p. 630-636. Includes references. (NAL Call No.: DNAL 4 AM34P).

0190

### Using drought-stressed corn: harvesting, storage, feeding, pricing and marketing.

Amaral, D.; Crist, B.; Heersche, G.; Johns, J.; Olson, K.; Bitzer, M.; Benson, F.; Meyer, L.; Shurley, D. Lexington, Ky. : The Service. ID - University of Kentucky, Cooperative Extension Service. Aug 1988. (86). 7 p. ill. (NAL Call No.: DNAL S544.3.K4K42).

silking but relieved within 2 d after silking did not reduce kernel number, kernel weight, or plant yield. The fewest number of kernels, 45% of the control, occurred for stress during the 7-d period after silking. Kernel weight was reduced by stress during the grain filling period, and the lowest weight, 51% of the control, occurred for stress 12 to 16 d after silking. Water use rates in treatment plant containers were compared to estimates of the soil moisture stress index (SMI) determined as the percentage of PAW in the containers. Water use rates declined when SMI declined below thresholds of between 0.20 and 0.30. These thresholds were similar to those reported for other crops. Thus, this analysis demonstrated that parameters based on PAW can be useful for evaluating the timing of moisture stress on maize yield components. *Agronomy journal*. Jan/Feb 1989. v. 81 (1). p. 61-65. Includes references. (NAL Call No.: DNAL 4 AM34P).

0191

### Vegetation management and corn growth and yield in untilled mixed-species perennial sod.

AGJOAT. Buhler, D.D. Mercurio, J.C. Madison, Wis. : American Society of Agronomy. *Agronomy journal*. May/June 1988. v. 80 (3). p. 454-462. Includes references. (NAL Call No.: DNAL 4 AM34P).

0192

### Water and nitrogen management in central Platte Valley of Nebraska.

JIDEDH. Ferguson, R.B. Eisenhauer, D.E.; Bockstädter, T.L.; Krull, D.H.; Buttermore, G. New York, N.Y. : American Society of Civil Engineers. *Journal of irrigation and drainage engineering*. July/Aug 1990. v. 116 (4). p. 557-565. Includes references. (NAL Call No.: DNAL 290.9 AM3PS (IR)).

0194

### Water management with conservation tillage.

Unger, P.W. Gerard, C.J.; Matocha, J.E.; Hons, F.M.; Bordovsky, D.G.; Wendt, C.W. College Station, Tex. : Texas Agricultural Experiment Station, Texas A&M Univ System, 1988. *Conservation tillage in Texas* / edited by F.M. Hons. Literature review. p. 10-15. Includes references. (NAL Call No.: DNAL S543.T4T43 no.15).

0195

### Weed control by subterranean clover used as a living mulch.

Enache, A.J. Ilnicki, R.D. Madison, Wis. : The Department. Progress report, clovers and special purpose legumes research - University of Wisconsin, Department of Agronomy. 1988. v. 21. p. 53. Includes references. (NAL Call No.: DNAL SB193.P72).

0193

### Water deficit timing effects on yield components in maize.

AGJOAT. Grant, R.F. Jackson, B.S.; Kiniry, J.R.; Arkin, G.F. Madison, Wis. : American Society of Agronomy. This study was designed to determine the interval of sensitivity of maize (*Zea mays* L.) yield components to moisture stress, and to evaluate that interval using estimates of plant available water (PAW). Individual maize plants were grown in containers in a glasshouse. For each treatment, water was withheld until the accumulated water use in well-watered control containers was 20 L, approximately twice the PAW in each container. Containers were well watered at all other times. Containers were weighed to determine water use rates and to estimate PAW. Moisture stress was assumed initiated when water use rates declined below the average for well-watered containers. The interval when kernel number was sensitive to moisture stress began 2 to 7 d after silking and ended 16 to 22 d after silking. Stress initiated prior to

0196

### Weed control in corn.

BAESD. Whitson, T.D. Miller, S.D. Laramie, Wyo. : The Service. Bulletin - Wyoming University, Cooperative Extension Service. In subseries: Wyoming weed control series. Apr 1989. (442.5). 8 p. (NAL Call No.: DNAL 275.29 W99B).

0197

### Weed control in corn (*Zea mays*) as affected by till-plant systems and herbicides.

WETEE9. Schweizer, E.E. Zimdahl, R.L.; Mickelson, R.H. Champaign, Ill. : The Society. *Weed technology* : a journal of the Weed Science Society of America. Jan/Mar 1989. v. 3 (1). p. 162-165. Includes references. (NAL Call No.: DNAL SB610.W39).

## (PLANT PRODUCTION - FIELD CROPS)

0198

### **Yield-loss relationships and economic injury levels for European corn borer (Lepidoptera: Pyralidae) populations infesting Pennsylvania field corn.**

JEENAI. Bode, W.M. Calvin, D.D. Lanham, Md. : Entomological Society of America. Field studies were conducted during 1986 and 1987 to quantify the relationship between the number of European corn borer, *Ostrinia nubilalis* (Hubner), larvae per corn plant, plant growth stage, and corn grain yield for Pennsylvania. Corn plants were artificially infested with third-instar *O. nubilalis* during four plant stages (10-leaf, 16-leaf, blister, and dough) with 0, 2, 4, or 6 larvae per plant. Differences in grain weights between the uninfested check plots and highest infestation levels for 10-leaf, 16-leaf, blister, and dough stages of corn development in 1986 were 63.84, 69.07, 47.09, and 13.17 g per plant, respectively. In 1987, corn grain weights were reduced at six larvae per plant from the check by 50.57, 33.73, 22.9, and 2.79 g per plant for 10-leaf, 16-leaf, blister, and dough stages of corn development, respectively. Based on the linear regressions of the relationship between number of larvae per plant and corn grain weight for all four corn growth stages by year, average grain weight reductions across years when stalk feeding was initiated during the 10-leaf, 16-leaf, blister, and dough stages of plant development were 5.94, 5.01, 3.13, and 2.41% per larva per plant, respectively. Economic injury levels are presented for cases in which 100% control of *O. nubilalis* populations is assumed, and a method is shown for calculating economic injury level values when less than 100% control is expected. Journal of economic entomology. Aug 1990. v. 83 (4). p. 1595-1603. Includes references. (NAL Call No.: DNAL 421 J822).

445-448. Includes references. (NAL Call No.: DNAL 421 J822).

0200

### **Yield response of corn stands to stalk borer (Lepidoptera: Noctuidae) injury imposed during early development.**

JEENAI. Davis, P.M. Pedigo, L.P. Lanham, Md. : Entomological Society of America. In a 3-yr study, visual injury and grain yield were evaluated for two full-season corn (*Zea mays* L.) hybrids infested by stalk borer larvae, *Papaipema nebris* (Guenee), at leaf stages 1 through 7. Individual plants were assigned a rating based upon a six-class scale, and the average rating per plot was determined; 80% of the total number of injured plants within each plot were classified as injured within 1 wk after infestation. A significant linear relationship between leaf stage and injury rating was detected in all years of the study, with injury rating declining at an average rate of  $0.332 \pm 0.033$  points per leaf stage. In all years, infested plots yielded significantly less grain than uninfested control plots. Average yields of Pioneer hybrids 3541 and 3377 were reduced by 24.8 and 18.9%, respectively, when compared with uninfested control plots. In 2 of 3 yr, yield losses declined linearly as plants were attacked later in development. However, in a drought-stressed year, leaf stage was independent of plot yield even though injury ratings for each leaf stage were very similar to those recorded during years with normal rainfall. Linear models, which regressed injury rating on yield, were developed and compared for each year and hybrid combination. Journal of economic entomology. Aug 1990. v. 83 (4). p. 1582-1586. Includes references. (NAL Call No.: DNAL 421 J822).

0199

### **Yield reduction from feeding by *Euschistus servus* and *Euschistus variolarius* (Heteroptera: Pentatomidae) on stage V2 field corn.**

JEENAI. Apriyanto, D. Townsend, L.H.; Sedlacek, J.D. Lanham, Md. : Entomological Society of America. Field studies conducted to investigate the effect of feeding of the brown stink bug, *Euschistus servus* (Say), and the onespotted stink bug, *E. variolarius* (Palisot de Beauvois), on corn growth and yield showed that aside from plant mortality, the production of tillers was the most apparent injury. During the 2-yr study, 52.5% of the plants exposed to the brown stink bug and 38.8% of those exposed to the onespotted stink bug formed tillers. In general, mean extended leaf heights of tillered plants (distance from the soil surface to tip of tallest extended leaf) were significantly shorter than those of untillered plants exposed to stink bugs and controls. Stink bug feeding also resulted in delayed silking of tillered plants. Mean grain weight per ear from plants that formed tillers was reduced significantly compared with controls, but yields from untillered plants were not. Effects of the two stink bug species were similar. Journal of economic entomology. Apr 1989. v. 82 (2). p.

0201

### **Yield response of corn subjected to western corn rootworm (Coleoptera: Chrysomelidae) infestation and lodging.**

JEENAI. Spike, B.P. Tollefson, J.J. Lanham, Md. : Entomological Society of America. Lodging of corn, *zea mays* L., is often attributed to injury by larvae of western corn rootworm, *Diabrotica virgifera* LeConte. Because leaves of lodged plants exhibit vertical and horizontal spatial aberrations, yield may be adversely affected because of reduced photosynthetic efficiency. In a 2-yr study, we used a factorial arrangement of rootworm infestation (0 and 1,200 eggs per 30.5-cm row) and lodging treatments (lodged and upright) to determine effects on plant biomass and grain yield. In a second study, we examined how plants lodged from rootworm injury differ from upright plants with respect to plant and ear height, root rating, total leaf area, and vertical leaf area distribution. In 1987, rootworm-infested and lodged plants had significantly reduced plant dry weight and grain yield at nearly all sampling dates. Lodging treatments reduced grain yield of infested plants by an additional 11.9% over yield of upright, infested plants.

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In 1988, no differences in dry weight or yield occurred with infested plants, but lodging treatments reduced grain yield by 34.3%. In a severely lodged canopy, plant and ear height and light interception were significantly reduced in comparison with those of upright plants. Linear regressions of incident light versus leaf areas above each 0.31-m increment in the corn canopy resulted in significant slope (light extinction) differences. Because dry weight and yield were more consistently reduced by lodging than by rootworm infestation treatments, lodging must be an important factor in the relation between rootworm infestation and yield loss. Journal of economic entomology. Oct 1991. v. 84 (5). p. 1585-1590. Includes references. (NAL Call No.: DNAL 421 J822).

0202

**1989 corn performance tests.**

GARRA. Day, J.L. Raymer, P.L.; Gipson, R.D. Athens, Ga. : The Stations. Research report - University of Georgia, College of Agriculture, Agricultural Experiment Stations. Nov 1989. (585). p. 1-25. (NAL Call No.: DNAL S51.E22).

0203

**1991 corn: insect, disease, nematode, and weed control recommendations.**

Everest, J.W. Patterson, M.G.; Mask, P. Auburn, Ala. : The Service. Circular ANR - Alabama Cooperative Extension Service, Auburn University. In subseries: Integrated Pest Management. Jan 1991. (428). 10 p. (NAL Call No.: DNAL S544.3.A2C47).

0204

**1992 weed control guide for field crops.**

MUCBA. Renner, K.A. Kells, J.J. East Lansing, Mich. : The Service. Extension bulletin E - Cooperative Extension Service, Michigan State University. Nov 1991. (434,rev.). 126 p. (NAL Call No.: DNAL 275.29 M58B).

# PLANT PRODUCTION - RANGE

0205

**Yield and quality of forage maize as influenced by hybrid, planting date, and plant density.**  
AGJOAT. Graybill, J.S. Cox, W.J.; Otis, D.J.  
Madison, Wis. : American Society of Agronomy.  
Although forage maize (*Zea mays L.*) is grown extensively on livestock operations, most management studies have focused on grain production. Field studies were conducted in New York to evaluate dry matter (DM) yield and forage quality responses of commercial hybrids to planting dates and densities. Six hybrids were planted on 25 April, 9 May, and 23 May and thinned to 5.0, 6.5, and 8.0 plants m<sup>-2</sup> in 1988 and 1989. A significant year X planting date interaction was observed for DM yield because dry early-season conditions in 1988 negated the advantage of early planting in northern latitudes (13.4, 13.9, and 14.6 Mg ha<sup>-1</sup> for planting dates 25 April, 9 May, and 23 May, respectively). When averaged across years, high plant densities increased DM yields (15.7, 16.5, and 17.5 Mg ha<sup>-1</sup> at 5.0, 6.5, and 8.0 plants m<sup>-2</sup> respectively) with no significant effect on harvest index (524, 523, and 526 g kg<sup>-1</sup> at 5.0, 6.5, and 8.0 plants m<sup>-2</sup>, respectively). A hybrid X density interaction was observed for DM yield that suggests that some hybrids in this study performed better at higher densities. Plant density had little effect on acid detergent fiber (ADF) and neutral detergent fiber (NDF) concentrations indicating that forage quality can be maintained at high densities. Hybrids showed distinct variation for ADF (186-217 g kg<sup>-1</sup>), NDF (414-434 g kg<sup>-1</sup>), and crude protein (CP) (72-77 g kg<sup>-1</sup>) concentrations. The forage quality differences among hybrids may be of sufficient magnitude to be of value to the forage producer. *Agronomy Journal*. May/June 1991. v. 83 (3). p. 559-564. Includes references. (NAL Call No.: DNAL 4 AM34P).

# PLANT BREEDING

0206

**Aflatoxin contamination in maize and its biocontrol.**  
Zuber, M.S. Lillehoj, E.B. Boca Raton, Fla. : CRC Press, 1988. Biocontrol of plant diseases / editors, K.G. Mukerji, K.L. Garg. Literature review. v. 2 p. 85-102. Includes references. (NAL Call No.: DNAL SB732.6.B56).

0207

**Aflatoxin in corn hybrids field inoculated with Aspergillus flavus.**  
AGJOAT. Scott, G.E. Zummo, N.; Lillehoj, E.B.; Widstrom, N.W.; Kang, M.S.; West, D.R.; Payne, G.A.; Cleveland, T.E.; Calvert, O.H.; Fortnum, B.A. Madison, Wis. : American Society of Agronomy. Corn (*Zea mays* L.) genotypes with resistance to *Aspergillus flavus* Link ex Fr. are needed to reduce aflatoxin contamination of grain. The primary objective of this study was to determine if the pinbar inoculation technique was effective in separating hybrids for resistance and susceptibility to kernel infection by *A. flavus* and aflatoxin contamination of the grain at a number of locations, but other inoculation techniques were evaluated at individual locations. Two single crosses, Mo18W X Mp313E and SC54 X Tx601, previously classified as resistant to kernel infection by *A. flavus* and two susceptible crosses, Mp68:616 X SC212M and GT106 X T202, were used. We found that hybrids previously classified as resistant to kernel infection by *A. flavus* had fewer kernels infected and lower aflatoxin concentration in the corn grain at harvest. However, these differences were not significant at all locations. Over six locations, resistant hybrids contained 58% less aflatoxin in the grain and 41% fewer infected kernels than susceptible hybrids. In addition to the pinbar, the side-needle, and to a lesser extent the knife inoculation technique, differentiated hybrid response to ear inoculation with *A. flavus*. Agronomy Journal. May/June 1991. v. 83 (3). p. 595-598. Includes references. (NAL Call No.: DNAL 4 AM34P).

0208

**Anthracnose kernel rot of maize caused by *Colletotrichum graminicola* (Ces.) Wils.: mode of entrance into and disease progression in ears.**  
Nankam, C. Foley, D.C. Cedar Falls, Iowa : The Academy. The Journal of the Iowa Academy of Science : JIAS. Sept 1988. v. 95 (3). p. 79-81. Includes references. (NAL Call No.: DNAL Q11.J68).

0209

**Association of Rmd1, a gene conditioning reaction to maize dwarf mosaic virus, with genes conditioning endosperm color (y1) and type (su2) in maize.**  
PHYTA. Roane, C.W. Tolin, S.A.; Aycock, H.S.; Donahue, P.J. St. Paul, Minn. : American Phytopathological Society. Factors in maize conditioning resistance to maize dwarf mosaic virus (MDMV) have been shown by others to occur on chromosome 6. Genes conditioning endosperm color (y1) and type (su2) also occur on chromosome 6. Therefore, maize inbred line B68, Oh7B, and Pa405 having Rmd1, and Va85 probably having Rmd1, a gene conditioning resistance to MDMV strain A (MDMV-A), were crossed to the genetic marker stock I1176, having the y1 and su2 genes and which is susceptible to MDMV. The crosses were assumed to be of the genotype Rmd1 Rmd1 Y1Y1 Su2Su2 X rmd1rmd1y1ysu2su2. All characters are monogenic and completely dominant; thus, a 3:1 ratio was expected for each character in the F2. The expected ratios were not achieved; therefore, the data were analyzed by calculating chi-square values for pairs of characters from contingency tables. For the B68, Oh7B, and Pa405 crosses, chi squares for MDMV reaction and endosperm color (rmd1/y1) were the largest, indicating closest association of gene loci. Chi squares for reaction and endosperm type (rmd1/su2), were the smallest, indicating least association of loci. The chi squares for endosperm color and type (y1/su2) were intermediate. Thus, rmd1 is near the y1 locus and on the centromere side of it, since it is a greater distance from su2 than is y1. The cross Va85 X I1176 produced results inconsistent with other crosses. Phytopathology. Dec 1989. v. 79 (12). p. 1368-1372. Includes references. (NAL Call No.: DNAL 464.8 P56).

0210

**Bioengineers' quest: drought-safe plants.**  
Gladwell, M. Washington, D.C. : The Washington Post Co. The Washington post. July 23, 1990. p. A3. (NAL Call No.: DNAL A00069).

0211

**Biosphere reserve established in Mexico to protect rare maize relative.**  
Guzman, M.R. Iltis, H.H. Fort Collins, Colo. : Laboratory for Information Science in Agriculture. Diversity. 1991. v. 7 (1/2). p. 82-84. (NAL Call No.: DNAL SB123.3.D5).

0212

**Breeding for insect resistance in maize.**  
Guthrie, W.D. Portland, Or. : Timber Press. Plant breeding reviews. Literature review. 1989. v. 6. p. 209-243. Includes references. (NAL Call No.: DNAL SB123.P55).

## (PLANT BREEDING)

0213

### Cell-autonomous recognition of the rust pathogen determines Rp1-specified resistance in maize.

SCIEA. Bennett, J.L. Blevins, W.E.; Ellingboe, A.H. Washington, D.C. : American Association for the Advancement of Science. The Rp1 gene of maize determines resistance to the leaf rust pathogen *Puccinia sorghi*. X-ray treatment of heterozygous (*Rp1 Oy/rp1 oy*) maize embryos generated seedlings with yellow sectors lacking Rp1. Yellow sectored seedling inoculated with rust spores gave rust pustule formation in yellow (*Rp1-lacking*) sectors and hypersensitive resistance in green tissue, thereby demonstrating that the Rp1 gene product is cellautonomous in its action. In cases where the hypersensitive reaction was initiated in green (*Rp1*) tissue next to a yellow sector, the hypersensitive response appeared to be propagated poorly, if at all, through *Rp1-lacking* cells. Science. July 8, 1988. v. 241 (4862). p. 208-210. ill. Includes references. (NAL Call No.: DNAL 470 SCI2).

0214

### Characteristics of bird-resistance in agricultural crops.

PVPCB. Bullard, R.W. Davis, Calif. : University of California. Proceedings ... Vertebrate Pest Conference. Literature review. 1988. (13th). p. 305-309. Includes references. (NAL Call No.: DNAL SB950.A1V4).

0215

**Combining ability for resistance in corn to fall armyworm and southwestern corn borer.**  
CRPSAY. Williams, W.P. Buckley, P.M.; Davis, F.M. Madison, Wis. : Crop Science Society of America. Both the fall armyworm, *Spodoptera frugiperda* (J.E. Smith), and the southwestern corn borer, *Diatraea grandiosella* Dyar, feed extensively on the leaves of corn, *Zea mays* L., in the southern USA. Their feeding can cause serious yield reductions. Several germplasm lines with resistance to leaf feeding by these two insect pests have been developed and released; however, only limited information is available on the inheritance of this resistance. No previous information on the relationships between resistance to fall armyworm and southwestern corn borer has been reported. The current investigation was undertaken to obtain information on the relative importance of general and specific combining ability in the inheritance of resistance to fall armyworms and southwestern corn borers and to compare the responses of the two insects to a diallel cross among inbred lines with varying degrees of resistance. Larval survival and growth were used to quantify levels of resistance. General combining ability was a highly significant source of variation among hybrids, but specific combining ability was a nonsignificant source of variation. Fall armyworm larval survival and weight on hybrids with varying levels of

resistance were highly correlated with southwestern corn borer survival and weight on the same hybrids. This suggests that selecting for resistance to one of these insects should increase resistance to both. Crop science. July/Aug 1989. v. 29 (4). p. 913-915. Includes references. (NAL Call No.: DNAL 64.8 C883).

0216

### Corn and corn improvement /G.F. Sprague and J.W. Dudley, editors.

Sprague, Gretchen.; Dudley, J. W. \_193i-. Madison, Wis. : American Society of Agronomy, c1988. xix, 986 p. : ill. (some col.) ; 24 cm. Includes bibliographies and index. (NAL Call No.: DNAL 4 Am392 no.18 1988).

0217

**Corn and sorghum breeding and management.** AKFRAC. York, J.O. Fayetteville, Ark. : The Station. Arkansas farm research - Arkansas Agricultural Experiment Station. Jan/Feb 1989. v. 38 (i). p. 6. (NAL Call No.: DNAL 100 AR42F).

0218

### Corn hybrid-starter fertilizer interaction for yield and lodging.

CRPSAY. Teare, I.D. Wright, D.L. Madison, Wis. : Crop Science Society of America. The value of placing small amounts of soluble fertilizers in close proximity to the seed at corn (*Zea mays* L.) planting was debated in the early 1980s for corn grown in a high-yield environment, but is becoming an accepted practice in the southeastern USA. The objective of this study was to evaluate yield and lodging of several corn hybrids to starter fertilizer application in a high-yield environment. Starter and no-starter were the two fertility treatments. Starter was applied as NH4-polyphosphate (10-15-0) in a band on the soil surface at planting. Rainfall was measured, and irrigations scheduled with tensiometers. Starter fertilizer significantly increased grain yields compared to no-starter. Hybrid X year and hybrid X starter treatment interactions were significant. Certain corn hybrids were identified as positive changers (Funks G4733, Asgrow RX777, Sunbelt 1880, Pioneer 3320, Jacques JX247, Jacques 8400, Northrup King PX9581, and Coker 8680) that consistently yielded more with starter than others identified either as nonchangers or as negative-changers. Percent lodging generally was greater with no starter fertilizer (year X starter and hybrid X starter interactions were non-significant). Hybrid X year interactions for percent lodging were significant. Certain corn hybrids (Jacques JX247, DeKalb DK748, and Jacques 8400) consistently exhibited less lodging than the hybrid mean when fertilized with a starter. The management implication is that certain corn hybrids may be profitably fertilized with a starter fertilizer but others

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may not, since they either do not respond (nonchangers) or respond negatively to starter fertilizer. Crop science. Nov/Dec 1990. v. 30 (6). p. 1298-1303. Includes references. (NAL Call No.: DNAL 64.8 C883).

0219

**Corn uptake and soil accumulation of nitrogen: management and hybrid effects.**

SSJD4. Ferguson, R.B. Schepers, J.S.; Hergert, G.W.; Lohry, R.D. Madison, Wis. : The Society. Inefficient use of fertilizer N by corn (*Zea mays L.*) can result in the accumulation of excessive amounts of NO<sub>3</sub>(-) subject to leaching losses in the crop root zone. The fate of fertilizer N as influenced by N rate, nitrapyrin

2-chloro-6-(trichloromethyl)pyridine, and corn hybrid was evaluated in a 3-yr study with sprinkler-irrigated corn. Variables were fertilizer-N rate (75, 150, and 300 kg N/ha); nitrapyrin (0 and 0.5 kg/ha), and corn hybrid (Pioneer hybrids 3377, 3475, and 3551). Nitrogen was applied as late-sidedressed (V6-V9) NH<sub>3</sub>. The fate of fertilizer N was evaluated by measurement of apparent fertilizer-N uptake (AFU), form of N in the fertilizer band prior to and following anthesis, and accumulation and distribution of N in the soil profile. There were no significant effects of hybrid on AFU across years, and no significant hybrid X nitrapyrin interactions on AFU. Nitrapyrin significantly reduced AFU across N rates and hybrids in 2 of 3 yr. Nitrate-N concentrations in the fertilizer band, in the presence of nitrapyrin, were reduced prior to anthesis in 1986. Higher NH<sub>4</sub>(+)-N concentrations in the fertilizer band in 1986, as well as trends towards higher total inorganic-N concentrations all 3 yr following anthesis, suggest mineralization of temporarily immobilized fertilizer NH<sub>4</sub>(+). Reduced AFU in the presence of nitrapyrin in 1986 and 1987 indicates reduced availability of fertilizer N consistent with a temporary immobilization process. Nitrate accumulation in the soil to a depth of 1.8 m after three growing seasons indicates a trend toward less NO<sub>3</sub>(-) accumulation where nitrapyrin was applied at N rates of 75 and 150 kg/ha. Nitrate concentrations in the soil at a depth of 1.8 m were significantly greater at the 150 and 300 kg N/ha rates, compared with the 75 kg N/ha rate or unfertilized soil, indicating probable movement of fertilizer N below the 1.8-m depth at the higher rates. These results indicate that nitrapyrin should not be applied with NH<sub>3</sub> at la. Soil Science Society of America journal. May/June 1991. v. 55 (3). p. 875-880. Includes references. (NAL Call No.: DNAL 56.9 S03).

0220

**Crop Genetics Inc. reports success against corn pest.**

Gladwell, M. Washington, D.C. : The Washington Post Co. The Washington post. Nov 20, 1989. p. 5-6. (NAL Call No.: DNAL A00069).

0221

**Current status of fall armyworm host strains.** FETMA. Pashley, D.P. Gainesville, Fla. : Florida Entomological Society. Florida entomologist. Paper presented at the "Fall Armyworm Symposium", 1988. Sept 1988. v. 71 (3). p. 227-234. maps. Includes references. (NAL Call No.: DNAL 420 F662).

0222

**Cytoplasmic male sterility and maternal inheritance of disease susceptibility in maize.** APPYA. Pring, D.R. Lonsdale, D.M. Palo Alto, Calif. : Annual Reviews, Inc. Annual review of phytopathology. Literature review. 1989. v. 27. p. 483-502. Includes references. (NAL Call No.: DNAL 464.8 AN72).

0223

**Defoliation effects on grain filling of R-nj color-selected maize strains.**

CRPSAY. Mostafavi, M.R. Cross, H.Z. Madison, Wis. : Crop Science Society of America. Grain yield in maize (*Zea mays L.*) is often related to rate and duration of grain filling, which can be influenced by selection for R-nj aleurone color expression. This study was conducted to determine how modifying the source/sink ratio affects grain-filling characteristics and R-nj color expression from two genetic backgrounds. Field experiments were conducted at Fargo, ND, with six synthetic strains derived from NDSF (early maturing) and NDSC (late maturing) and divergently selected for R-nj color expression. A single plant from each plot was tagged and pollinated with bulked pollen from 'Cudu', a source homozygous for R-nj. Three defoliation treatments (0, 50, and 100%) were applied at silking. Four sequential 15-kernel samples five each from the apical, mid-ear, and basal sections of the ears) were taken at 3- to 4-d intervals from alternate kernel rows during the linear phase of grain filling and at kernel maturity. Combined analyses of data over years indicated that source reduction (defoliation) reduced color intensity (CI), rate of dry matter accumulation (RDMA), and kernel weight. Strains selected for high color expression had higher RDMA and kernel weight than low color selections. As expected, the CI ratings corresponded to color selection groups. Color expression was positively correlated with RDMA and kernel weight. Results suggest that R-nj color expression is related to sugar concentration in the endosperm during kernel development, and that selection for differences in color expression may be a simple, inexpensive means of modifying RDMA. Crop science. Mar/Apr 1990. v. 30 (2). p. 358-362. Includes references. (NAL Call No.: DNAL 64.8 C883).

## (PLANT BREEDING)

0224

### Detection and identification of *Peronosclerospora sacchari* in maize by DNA hybridization.

PHYTA. Yao, C.L. Magill, C.W.; Frederiksen, R.A.; Bonde, M.R.; Wang, Y.; Wu, P.S. St. Paul, Minn. : American Phytopathological Society. The causal organism of an incidence of maize downy mildew in Southern China proved difficult to classify by standard techniques. The pathogen, subsequently identified as *Peronosclerospora sacchari*, was detected by DNA hybridization in endosperm, pericarp, and pedicel tissues, but not in embryos of infected maize seeds. Plasmid pCLY83, which had been selected from a *P. maydis* DNA library, served as the probe. No evidence for hybridization was detected between the probe and DNAs extracted from ten common seedborne fungi of maize: *Colletotrichum graminicola*, *Acremonium strictum*, *Curvularia lunata*, *Fusarium moniliforme*, *Bipolaris maydis*, *Macrophomina phaseolina*, *Rhizoctonia* sp., *Rhizopus* sp., *Penicillium* sp., and *Alternaria* sp. Hybridization was also not detected with DNAs isolated from plant tissues infected with *Sclerospora graminicola* or *Sclerotophthora macrospora*. The hybridizing DNA of the corn pathogen from China was readily distinguished from *P. sorghi* and *P. maydis* by differences in EcoRI, PvuI, BamHI and HindIII restriction patterns. RFLP patterns on blots of DNA from the plants showing symptoms of downy mildew in this case were the same as those for *P. philippinensis* and *P. sacchari*, now believed to be conspecific. *Phytopathology*. Aug 1991. v. 81 (8). p. 901-905. Includes references. (NAL Call No.: DNAL 464.8 P56).

0225

### Developing herbicide resistance in corn.

Schoper, J. Armstrong-Gustafson, P.; McBratney, B. Urbana, Ill. : Cooperative Extension Service, Univ of Illinois at Urbana-Champaign, 1991 . Illinois Agricultural Pesticides Conference summaries of presentations January 8, 9, 10, 1991, Urbana, Illinois / Univ of Illinois at Urbana-Champaign, Coop Ext Serv, in coop with the Illinois Natural History Survey. "Proceedings of the 1991 Illinois Agricultural Pesticides Conference," January 8-10, 1991, Urbana, Illinois. p. 59-60. (NAL Call No.: DNAL SB950.2.I3I4).

0226

### Development of open-pollinated varieties, non-conventional hybrids and inbred lines of tropical maize with resistance to fall armyworm, *Spodoptera frugiperda* (Lepidoptera: Noctuidae), at CIMMYT.

FETMA. Mihm, J.A. Smith, M.E. · Deutsch, J.A. Gainesville, Fla. : Florida Entomological Society. Florida entomologists paper presented at the "Fall Armyworm Sympos", 1988. Sept 1988. v. 71 (3). p. 262-268. 1udes references. (NAL Call No.: D 420 F662).

0227

### Developmental predisposition of maize to anthracnose stalk rot.

PLDIDE. Keller, N.P. Bergstrom, G.C. St. Paul, Minn. : American Phytopathological Society. Plant disease. Nov 1988. v. 72 (11). p. 977-980. Includes references. (NAL Call No.: DNAL 1.9 P69P).

0228

### Diallel analysis of maize inbreds for resistance to gray leaf spot.

CRPSAY. Ulrich, J.F. Hawk, J.A.; Carroll, R.B. Madison, Wis. : Crop Science Society of America. Gray leaf spot (GLS) (caused by *Cercospora zeae-maydis* Tehon & Daniels) is becoming an increasingly prevalent disease of maize (*Zea mays L.*) in the USA. This study was conducted to determine the inheritance of GLS resistance. Nine inbreds and their 36 singlecross hybrids were evaluated for resistance in field studies conducted in 1987 and 1988. Plants were rated for disease development on a plot basis using a scale of 0.5 (resistant) to 5.0 (susceptible). Unweighted entry means for each year were analyzed using Gardner and Eberhart's diallel Analysis III for fixed effects. Highly significant ( $P < 0.01$ ) genotypic and general combining ability (GCA) differences were seen for resistance; the specific combining ability (SCA) mean square was not significant. Inbreds T222 and Mo18W had significant negative ( $P < 0.01$ ) GCA effects of -0.81 and -0.76, respectively, and were significantly more resistant in crosses than the other inbreds. The mean rating of crosses involving CI64 (GCA = -0.28,  $P < 0.05$ ) was lower than the mean of crosses involving the three susceptible inbreds Mo17Ht, DE8ii, and B73Ht (which had positive GCA effects of 0.26,  $P < 0.05$ , 0.47, and 1.08  $P < 0.01$ , respectively). As an inbred and in crosses, B73Ht was more susceptible than any other inbred evaluated, rating 3.1 in crosses compared with 1.6 for both T222 and Mo18W. The high level of resistance in inbreds T222 and Mo18W may be bred into elite, but GLS-susceptible, lines using backcross or recurrent selection procedures that utilize additive effects. Crop science. Nov/Dec 1990. v. 30 (6). p. 1198-1200. Includes references. (NAL Call No.: DNAL 64.8 C883).

0229

### Diallel analysis of resistance to anthracnose stalk rot in maize inbreds.

CRPSAY. Callaway, M.B. Smith, M.E.; Coffman, W.R. Madison, Wis. : Crop Science Society of America. Anthracnose stalk rot (ASR), caused by *Colletotrichum graminicola* (Ces.) Wils., has become an important disease of maize (*Zea mays L.*) in recent years. The purposes of this study were to evaluate general and specific combining ability effects for ASR resistance in a group of maize inbreds adapted to the northeastern USA, and to evaluate two commonly used ASR rating methods. Eight maize inbreds were

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crossed in a fixed effects diallel mating design and parents and crosses were grown at locations in New York, Delaware, and Pennsylvania. The two methods of rating for ASR resistance were: (i) total number of internodes infected, and (ii) number of internodes greater than 75% infected. The inbreds LB31B, RD5264, and RD6501 had highly significant negative general combining ability effects for ASR ratings, indicating that these lines would be good choices as parents where ASR resistance is desired. The inbreds RD5215, RD5217, RD5529, B59Ht, and B37 had significant, positive general combining ability effects. Specific combining ability was important for certain combinations of lines. Results for the two rating methods were practically identical. Only one of the two rating methods need be used in a given year. The evaluation methods should be alternated at yearly intervals to minimize the possibility of preferential selection for a particular mechanism of resistance. Crop science. Mar/Apr 1990. v. 30 (2). p. 335-337. Includes references. (NAL Call No.: DNAL 64.8 C883).

0230

Different alleles of *Ustilago maydis* are necessary for maintenance of filamentous growth but not for meiosis.

PNASA. Banuett, F. Herskowitz, I. Washington, D.C. : The Academy. Proceedings of the National Academy of Sciences of the United States of America. Aug 1989. v. 86 (15). p. 5878-5882. ill. Includes references. (NAL Call No.: DNAL 500 N21P).

0231

Differential imazaquin tolerance and behavior in selected corn (*Zea mays*) hybrids.

WEESA6. Sander, K.W. Barrett, M. Champaign, Ill. : Weed Science Society of America. 'Cargill 921', 'Great Lakes 422', Northrup King 9410', 'Pioneer 3901', 'Pioneer 3737', and 'Stauffer 5650' corn hybrids were tested in the greenhouse for imazaquin tolerance. Imazaquin rates that reduced shoot growth 50%, when compared to the untreated hybrid check, ranged from 17 to 50 g/ha. When averaged together, the three most tolerant hybrids (Cargill 921, Pioneer 3901, and Great Lakes 422) were approximately one-half as sensitive to imazaquin as the three least tolerant hybrids (Northrup King 9410, Pioneer 3737, and Stauffer 5650). Studies were conducted to determine if the observed differential tolerance was caused by differences in acetolactate synthase (ALS, EC 4.1.3.18) levels and sensitivity of ALS to imazaquin. Differential imazaquin uptake, translocation, and/or metabolism were also studied as a basis for the tolerance range as was seed size and seedling growth. There were differences among hybrids in the physiological and growth parameters studied; however, these differences did not correlate with imazaquin tolerance. None of the factors studied could alone account for the differences in imazaquin tolerance. Weed science. May 1989. v. 37 (3).

p. 290-295. Includes references. (NAL Call No.: DNAL 79.8 W41).

0232

Differential response of corn hybrids and inbreds to metolachlor.

WEESA6. Rowe, L. Rossman, E.; Penner, D. Champaign, Ill. : Weed Science Society of America. Greenhouse studies were conducted to determine the response of 200 corn hybrids and 29 inbreds to metolachlor applied at 4.5 kg ai ha<sup>-1</sup>. Both hybrids and inbreds varied in their response to the herbicide. The distribution of injury revealed a normal distribution curve with most of the hybrids having a midlevel of tolerance. Some hybrids were very tolerant, while others were quite sensitive. Laboratory studies were conducted to evaluate absorption and metabolism of <sup>14</sup>C-metolachlor for a subset of tolerant and sensitive hybrids. There was no observed difference in the product of metolachlor metabolism in the tolerant and sensitive hybrids. The observed variability in metolachlor tolerance among hybrids appeared due to differences in the amount of metolachlor absorption and metabolism and differences at the site of metolachlor action. The tolerant 'Great Lakes 584' hybrid absorbed significantly less <sup>14</sup>C-metolachlor than did the sensitive 'Pioneer 3744', while the tolerant 'Cargill 7567' metabolized significantly faster more <sup>14</sup>C-metolachlor than the other hybrids. The internal concentrations of available <sup>14</sup>C-metolachlor were the same for the tolerant Cargill 7567 and the sensitive 'Northrup King 9283' after 8 h, indicating differences at the site of action of metolachlor for these two hybrids. Weed science. Nov 1990. v. 38 (6). p. 563-566. Includes references. (NAL Call No.: DNAL 79.8 W41).

0233

Differential tolerance of corn genotypes to DPX-M6316.

WEESA6. Eberlein, C.V. Rosow, K.M.; Geadelmann, J.L.; Openshaw, S.J. Champaign, Ill. : Weed Science Society of America. Ten corn inbred lines were field evaluated for their tolerance to DPX-M6316 at 32 and 64 g ai/ha. Inbreds 'A619', 'A641', and 'ND246' were highly susceptible to DPX-M6316; inbreds 'A671', 'A632', and 'B73' were highly tolerant; and inbreds 'A654', 'CM105', 'W153R', and 'M107' were intermediate in their response. The basis for differential tolerance was studied by comparing the susceptibility of acetolactate synthase (ALS) to inhibition by DPX-M6316 in tolerant A671 and susceptible A619, and by examining the absorption, translocation, and metabolism of DPX-M6316 in both genotypes. I(50) values for DPX-M6316 inhibition of ALS activity in extracts from etiololated shoots of A671 and A619 were similar, 15.6 and 17.4 mM, respectively. There was little difference in <sup>14</sup>C-DPX-M6316 absorption by the two inbreds, but twice as much of the absorbed <sup>14</sup>C was translocated out of the treated leaf of A619 (13%) compared to A671 (6%). Differences in

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translocation may have been due to much more rapid DPX-M6316 metabolism in A671 than in A619. Extracts from treated leaves of A671 had only 23% DPX-M6316 remaining 5.5 h after treatment (HAT) compared to 78% DPX-M6316 remaining in extracts from A619 leaves.

Therefore, rate of metabolism was the major factor involved in the tolerance of A671 and the susceptibility of A619 to DPX-M6316. Weed science. Sept 1989. v. 37 (5). p. 651-657. Includes references. (NAL Call No.: DNAL 79.8 W41).

0234

### Distributions among S1 lines for European corn borer (Lepidoptera: Pyralidae) and stalk rot resistance ratings in two maize synthetics improved by recurrent selection.

JEENAI. Nyhus, K.A. Russell, W.A.; Guthrie, W.D. Lanham, Md. : Entomological Society of America. Four cycles of recurrent selection were used to reduce leaf-feeding damage caused by first-generation European corn borer (ECB), *Ostrinia nubilalis* Hubner, and pith decay associated with *Diplodia*, *Diplodia maydis* (Berkeley) Saccardo, stalk rot (DSR) in two maize, *Zea mays* L., synthetics, BSAA and BSBB. Recurrent selection was based on the evaluation of S(1) progenies. For this study, 100 unselected S(1) lines from each of the original (C0) and improved (C4) populations of BSAA and BSBB were evaluated for ECB resistance, DSR resistance, and stalk rind puncture. The distributions of S(1) lines for the three traits and the genetic relationships among traits were evaluated to determine the effectiveness of the recurrent selection programs. The C4s of both synthetics were more resistant than the C0s to ECB leaf feeding after artificial infestations, were more resistant to DSR after artificial inoculations, and possessed harder stalks. The differences between the C0 and C4 means were highly significant (P less than 0.01) in all instances. Reductions in genetic variation were observed in BSAA for ECB ratings and in BSBB for all three traits. The reductions in genetic variation were especially dramatic for ECB ratings, indicating that relatively few gene pairs were segregating for leaf-feeding resistance in BSAA and BSBB. Low and generally nonsignificant correlations between DSR ratings and rind puncture readings indicated that selection for both traits would be justified to improve field stalk lodging resistance. Journal of economic entomology. Feb 1989. v. 82 (1). p. 239-245. Includes references. (NAL Call No.: DNAL 421 J822).

0235

Dominant mutations causing alterations in acetyl-coenzyme A carboxylase confer tolerance to cyclohexanedione and aryloxyphenoxypropionate herbicides in maize. PNASA. Parker, W.B. Marshall, L.C.; Burton, J.D.; Somers, D.A.; Wyse, D.L.; Gronwald, J.W.; Gengenbach, B.G. Washington, D.C. : The Academy. Proceedings of the National Academy of

Sciences of the United States of America. Sept 1990. v. 87 (18). p. 7175-7179. ill. Includes references. (NAL Call No.: DNAL 500 N21P).

0236

### Effect of constitutive and herbivore-induced extractables from susceptible and resistant soybean foliage on nonpest and pest noctuid caterpillars.

JEENAI. Wheeler, G.S. Slansky, F. Jr. Lanham, Md. : Entomological Society of America. Soybean foliage from susceptible ('Bragg') and resistant (PI 229358 and D75-10169) lines was extracted in several nonpolar and polar organic solvents to assess constitutive (mite-free) and induced (mite-damaged) activity against nonpest and pest noctuid caterpillars. The benzene fraction, incorporated in artificial diet, contained most of the constitutive activity of both the resistant and susceptible lines, as indicated by reduced relative growth rate (RGR) of velvetbean caterpillar, *Anticarsia gemmatalis* Hubner; corn earworm, *Helicoverpa* (= *Heliothis*) *zea* (Boddie); tobacco budworm, *H. virescens* (F.); and fall armyworm, *Spodoptera frugiperda* (J. E. Smith) compared with larvae fed the extract- and solvent-free control diet. Induced activity from mite-damaged greenhouse-grown plants and *A. gemmatalis*-damaged field-grown plants was detected primarily in the petroleum ether fraction. Among the species tested on the induced fractions (*A. gemmatalis*, *S. frugiperda*, and the cabbage looper, *Trichoplusia ni* (Hubner)), *S. frugiperda* was the most sensitive species, as demonstrated by reduced RGR. Overall, among the species (*H. zea*, *H. virescens*, and *T. ni*) more tolerant of the soybean foliage fractions, only *H. zea* is a major soybean foliage pest. Surprisingly, among the two most sensitive species, *A. gemmatalis* is a legume specialist and major soybean pest, whereas *S. frugiperda* is a polyphagous species but not a soybean pest. These results suggest that presumed soybean-adapted species may not be more resistant than soybean-naive species to the deleterious effects of soybean foliage extracts. Journal of economic entomology. June 1991. v. 84 (3). p. 1068-1079. Includes references. (NAL Call No.: DNAL 421 J822).

0237

### Effect of host resistance on pathogenesis of maize dwarf mosaic virus.

PHYTA. Law, M.D. Moyer, J.W.; Payne, G.A. St. Paul, Minn. : American Phytopathological Society. The pathogenesis of maize dwarf mosaic virus (MDMV-A) in maize was characterized in locally and systemically infected tissues of susceptible and resistant maize genotypes. Resistant genotypes used in this investigation had been classified by the absence of systemic symptom expression. Because some plants of the resistant genotype occasionally expressed systemic symptoms, we refer to the presence of symptoms as the susceptible phenotype and the absence of symptoms as the resistant phenotype. MDMV capsid protein was detected 2 days after

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inoculation in the inoculated leaf at the site of inoculation in both susceptible and resistant genotypes. Proximal invasion from the site of inoculation also was detected in both susceptible and resistant genotypes although invasion was delayed 6 days in the resistant genotypes. The resistant genotype, PB3187, expressed both susceptible and resistant phenotypes. When a leaf was inoculated before the emergence of the next three subsequent leaves, systemic symptoms were expressed (susceptible phenotype). However, when a leaf was inoculated after the emergence of the next three subsequent leaves, the resistant phenotype was expressed. Infectious virus was found within the inoculated leaf, within stalk tissue below the inoculated leaf, and in the roots of PB3187 plants expressing either the susceptible or resistant phenotype. Infectious virus was detected only in tissue above the inoculated leaf in PB3187 plants expressing the susceptible phenotype but not in equivalent leaves of plants expressing the resistant phenotype. This phenomenon of differential phenotype expression was not affected by plant age or temperature. We propose that the resistance mechanism expressed in PB3187 acts at a specific point of systemic virus transport, thereby limiting upward virus transport from the roots to young, developing leaves. *Phytopathology*. July 1989. v. 79 (7). p. 757-761. illl. Includes references. (NAL Call No.: DNAL 464.8 P56).

0238

**Effect of research on commercial hybrid maize resistance to European corn borer (Lepidoptera: Pyralidae).**  
JEENAI. Barry, D. Darrah, L.L. Lanham, Md. : Entomological Society of America. Economic loss caused by the European corn borer, *Ostrinia nubilalis* (Hubner), amounts to millions of dollars per year. Maize breeding programs funded from public and private sources have developed and released germplasm with resistance to European corn borer whorl leaf feeding and, to a lesser extent, sheath and sheath collar feeding during flowering. A 4-yr study of 100 hybrids each year was undertaken to evaluate levels of resistance to European corn borer available to the farmer in commercial hybrids. About 90% of the maize hybrids evaluated have some resistance to whorl leaf feeding and about 75% have some resistance to sheath and sheath collar feeding. In approximately two-thirds of the hybrids evaluated in Missouri, the resistance levels could be further enhanced and susceptible hybrids improved with the introduction of additional genes for resistance. *Journal of economic entomology*. June 1991. v. 84 (3). p. 1053-1059. Includes references. (NAL Call No.: DNAL 421 J822).

0239

**Effect of several management tactics on adult mortality and progeny production of *Sitophilus zeamais* (Coleoptera: Curculionidae) on stored corn in the laboratory.**  
JEENAI. Sedlacek, J.D. Barney, R.J.; Price, B.D.; Siddiqui, M. Lanham, Md. : Entomological Society of America. A factorial experiment was conducted to examine the effects of temperature, corn hybrid, moisture content of corn, malathion treatment, and presence or absence of surface-contaminating fungi on adult survival, progeny production, progeny weight, and time to 50% emergence of the maize weevil, *Sitophilus zeamais* Motschulsky. Temperature, moisture content, surface contamination, and malathion significantly influenced maize weevil mortality. Progeny production was affected by these factors as well as by the corn hybrids. Progeny weight and time to 50% emergence were affected only by temperature and moisture content. There were several highly significantly interactions, most notably between temperature and moisture content. Temperature, corn hybrid, and moisture content appear to offer the greatest potential for nonchemical control of maize weevil in bulk grain stores. *Journal of economic entomology*. June 1991. v. 84 (3). p. 1041-1046. Includes references. (NAL Call No.: DNAL 421 J822).

0240

**Effect of sodium bisulfite on peroxidase activity and electrolyte leakage in maize in relation to sporulation of *Bipolaris maydis* race T.**  
OJSCA. Akhtar, M. Garraway, M.O. Columbus, Ohio : Ohio Academy of Science. *Ohio journal of science*. June 1990. v. 90 (3). p. 71-76. Includes references. (NAL Call No.: DNAL 410 OH3).

0241

**Effects of a resistant maize genotype and cytoplasmic polyhedrosis virus on growth and development of the corn earworm (Lepidoptera: Noctuidae).**  
EVETEX. Bong, C.F.J. Sikorowski, P.P.; Davis, F.M. Lanham, Md. : Entomological Society of America. The effects of a maize, *Zea mays* L., genotype, 'Zapalote chico' 2451~ P)(C3), resistant to the corn earworm, *Helicoverpa zea* (Boddie), alone and in combination with cytoplasmic polyhedrosis virus (CPV) on the growth and development of corn earworm were investigated. Corn earworm fed 'Zapalote Chico' silks incorporated into a laboratory diet were significantly smaller, had higher mortality, and required longer to complete each developmental stage when compared to those on control diet. CPV significantly reduced corn earworm larval and adult weights, prolonged larval developmental period, and adversely affected percentages of pupation and adult emergence. 'Zapalote Chico' and CPV interacted synergistically with respect to pupal and adult weights and antagonistically with respect to

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larval weight. Nevertheless, adults from treatment combinations of CPV and silk weighed up to 41% less than those of control diet. 'Zapalote Chico' and CPV were independent in action with respect to percent larval survival, percent pupation and percent adult emergence of corn earworm. The effects of silk and CPV on developmental times were most severe for the larval stage. Larval period was prolonged 5.3 d when larvae were fed 'Zapalote Chico' alone; but, in combination with CPV (which increased larval period by 1.6 d), duration of larval stage was synergistically prolonged 10.8 d (mean larval period, 23.8 d) when compared to that of the control diet. Pupal period in the treatment with combined silk and CPV was 13.2 d, which was significantly longer than the 11.8 d on control diet. The mean developmental period from neonate to adult for corn earworm fed silk was 30.3 d; but it synergistically increased to 37.4 d when CPV was given together with 'Zapalote Chico', as compared to 24.8 d in the control. The potential use of maize resistance and CPV in the integrated pest management of corn earworm is discussed. Environmental entomology. Aug 1991. v. 20 (4). p. 1200-1206. Includes references. (NAL Call No.: DNAL QL461.E532).

### 0242

The effects of heat treatment and inoculum concentration on growth and sporulation of *Penicillium* spp. on corn genotypes in storage. PHYTA. Yao, B. Tuite, J. St. Paul, Minn. : American Phytopathological Society. The effects of heat treatment and inoculum concentration of *Penicillium brevi-compactum*, *P. cyclopium*, and *P. viridicatum*, on storability of corn kernels were determined in separate tests for 10 genotypes of dent corn and a visual flint (VF) selection. Hand-shelled corn grown during 1983-1985 was used. Kernels of B73 X Mo17 and Dekalb XL67, resistant, and H95 very susceptible and VF, moderately susceptible to storage *Penicillia* were heated at 80 C for 20 min, then inoculated with  $2 \times 10(3)$  spores/g and stored at 88% RH and 14 C for 49 days. Host reaction was determined by a visible mold rating on individual kernels and number or propagules isolated after dilution on a modified potato-dextrose agar. Molding was substantially increased by the heat treatment as measured by propagules and less so by visible mold for all four genotypes. Increase was greater for the resistant hybrids but the disease rankings among the genotypes remained. The heat-treated resistant hybrids did not support significantly more sporulation of *Penicillium* than the unheated, susceptible genotypes. In three tests, a total of 11 corn genotypes were inoculated with  $2 \times 10(3)$  to 10(4) or  $2 \times 10(3)$  to 10(5) spores of *Penicillium* spp. per gram of corn and stored at 13-14 C and 88% RH. Increasing the inoculum to either 10(4) or 10(5) spores/g generally had no significant effect on relative resistance as measured by propagules and visible mold, although there was an increase in propagules with an increase in the amount of inoculum, particularly when 2  $\times$  10(4) or 10(5) spores/g was used. There appeared to be a more defined

separation of hybrids with inoculum at  $2 \times 10(4)$  and 10(5) than at  $2 \times 10(3)$  spores/g. Phytopathology. Oct 1989. v. 79 (10). p. 1101-1104. Includes references. (NAL Call No.: DNAL 464.8 P56).

### 0243

#### Effects of resistant maize silks on corn earworm (*Lepidoptera: Noctuidae*) biology: a laboratory study.

JEENAI. Wiseman, B.R. Isenhour, D.J. Lanham, Md. : Entomological Society of America. Results of a laboratory study show that even low levels of resistant maize, *Zea mays* L., silks reduced corn earworm, *Heliothis zea* (Boddie), growth and extended the life cycle by about 3 d. An intermediate level of resistance in maize silks reduced corn earworm growth, extended developmental time by about 8 d per generation, and subsequently reduced egg production by approximately 30%. A high level of resistance in maize silks reduced corn earworm growth, extended the life cycle by about 20 d, and reduced egg production by about 65% per generation. In addition to these parameters, if corn earworm attacked maize each generation, the intermediate level of this type of resistance would eliminate about two generations per year and the high level of resistance 40-50% of the generations per year. Thus, if hybrid maize can be developed with intermediate to high levels of resistance to corn earworm, then populations that usually devastate alternate crops can be dramatically reduced while reducing pesticide use by growers. Journal of economic entomology. Apr 1990. v. 83 (2). p. 614-617. Includes references. (NAL Call No.: DNAL 421 J822).

### 0244

#### Effects of temperature and light on virulence of *Exserohilum turcicum* on corn.

PHYTA. Thakur, R.P. Leonard, K.J.; Leath, S. St. Paul, Minn. : American Phytopathological Society. Isolates of races 1, 2, and 4 of *Exserohilum turcicum* were tested for virulence at day/night temperatures of 22/18 or 26/22 C on seedlings of corn inbreds H4460 and B37 and their backcross lines with the Ht1 gene for resistance. Race 2 was virulent on B37 Ht1 at both 22/18 and 26/22 C but avirulent on H4460Ht1 at 26/22 C. Race 2 induced normal susceptible-type lesions on inbreds B37 and H4460 at both 22/18 and 26/22 C, and the number of lesions per plant was greater at reduced light intensities. Seedlings of H4460Ht1 grown at 22/18 C before inoculation became resistant to race 2 if they were transferred to 26/22 C within the first 3 days after inoculation. Conversely, if they were grown at 26/22 C and transferred to 22/18 C within 3 days after inoculation with race 2, they developed normal susceptible-type lesions; if they were transferred later, they developed intermediate- and susceptible-type lesions. If H4460 seedlings were grown at 22/18 C before inoculations, the lengths of lesions induced by races 2 and 4 were significantly correlated

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with the number of days they remained at 22/18 C before transfer to 26/22 C, but if they were grown at 26/22 C and transferred to 22/18 C, the lesion length were not significantly affected by the number of days at 26/22 C after inoculation. *Phytopathology*. June 1989 v. 79 (6). p. 631-635. Includes references. (NAL Call No.: DNAL 464.8 P56).

0245

**Effects of temperature on development of corn earworm (Lepidoptera: Noctuidae) on meridic diets of resistant and susceptible corn silks.** EVETEX. Wiseman, B.R. Isenhour, D.J. Lanham, Md. : Entomological Society of America. Effects of interactions among temperature (20, 25, and 30 degrees C), known resistant and susceptible corn genotypes ('Zapalote Chico' and 'Stowell's Evergreen'), and concentrations of corn silk material-pinto bean diet mixture (0 and 18.75, 37.5 and 67.0 mg) on corn earworm, *Heliothis zea* (Boddie), growth ad developmental parameters were evaluated. Parameters measured were: 9-d larval weights, developmental time of larvae, weight of pupae, and days to adult eclosion. Corn earworm growth was slowest at 20 degrees C and fastest at 30 degrees C. Significant (P less than 0.05) differences caused by the resistant 'Zapalote Chico' compared with the susceptible 'Stowell's Evergreen' were measured consistently at 25 degrees C for all four developmental parameters. The median temperature (25 degrees C) appears to be optimum for detecting growth differences between resistant and susceptible plant materials regardless of silk concentration. *Environmental entomology*. Aug 1989. v. 18 (4). p. 683-686. Includes references. (NAL Call No.: DNAL QL461.E532).

0246

**Efficacy and mode of action of CGA-154281, a protectant for corn (*Zea mays*) from metolachlor injury.**

WEESA6. Rowe, L. Kells, J.J.; Penner, D. Champaign, Ill. : Weed Science Society of America. Greenhouse and field studies were conducted to determine the influence of herbicide rate, hybrid variability, and soil moisture on the effectiveness of CGA-154281 in protecting corn seedlings from metolachlor injury. High rates of metolachlor caused significant injury to seedlings of sensitive corn hybrids. However, with metolachlor plus CGA-154281, very few injury symptoms were observed, even with the 7.8 kg ha<sup>-1</sup> rate and the most sensitive hybrid. Corn seedlings were not injured by metolachlor plus CGA-154281 at the highest soil moisture level evaluated, whereas those treated with metolachlor alone showed 70% injury. Metolachlor injury increased as soil moisture content increased. In the greenhouse, CGA-154281 did not protect any of the eight weed species tested against injury by 2.2 kg ha<sup>-1</sup> metolachlor. In laboratory studies, CGA-154281 did not alter the absorption of 14C-metolachlor during an 8-h period. Qualitative comparison of the metabolism of

metolachlor in the presence or absence of the protectant indicated that metolachlor was metabolized to a more polar metabolite, believed to be a glutathione conjugate. However, CGA-154281 significantly enhanced the rate of metabolism of metolachlor in three of the four hybrids tested. Metolachlor metabolism activity may already have been functioning at a maximum level in the unaffected hybrid. *Weed science*. Jan/Mar 1991. v. 39 (1). p. 78-82. Includes references. (NAL Call No.: DNAL 79.8 W41).

0247

**Elite maize germplasm: reactions to maize dwarf mosaic and maize chlorotic dwarf viruses.** CRPSAY. Louie, R. Knoke, J.K.; Findley, W.R. Madison, Wis. : Crop Science Society of America. Information developed on the reactions of elite maize germplasm to maize dwarf mosaic (MDMV) and maize chlorotic dwarf (MCDV) viruses should aid breeding for resistance to these pathogens. The reactions of 23 dent maize (*Zea mays* L.) inbreds (plus one synthetic) and 46 hybrids were evaluated in the field and greenhouse following artificial inoculation with MCDV and two strains (A and B) of MDMV. Infection, as determined by diagnostic symptoms, was higher in greenhouse than in field tests. Furthermore, most of the apparent resistance to MDMV-A in the field was not confirmed when inoculations were made on younger, more succulent plants in the greenhouse. Inbreds B68, Oh1EP, Pa11, Pa405, and the synthetic, OhS2, were immune or highly resistant to MDMV-A and -B. Inbred B64 was only resistant to MDMV-B. No inbred was immune to MCDV, but Ga209, Oh7B, Pa11, Tx601, and Oh1EP had the lowest disease incidence in the field, whereas Pa11 and B68 were the most resistant in the greenhouse. Most of the 32 field-planted hybrids that were resistant to MDMV-A had A632, A634, B64 or B68 as one parent; for MDMV-B, only B64 or B68 germplasm conveyed effective resistance. Hybrids B64 X B68 and B68 X B64 were immune to MDMV-A and -B in both field and greenhouse tests. The best and poorest hybrid reactions to MCDV in the field were B68 X Mo17 and A632 X B73, respectively. The most resistant hybrid (Mo17 X B64) in the greenhouse had > 50% infected plants. Plant height and yield losses in inbreds and hybrids to MDMV were minimal whereas MCDV usually caused significant height (34% average) and yield reductions (72% average). The reactions of these elite sources of germplasm to MDMV and MCDV suggest that evaluations for virus resistance in maize should include both field and greenhouse test environments. *Crop science*. Nov/Dec 1990. v. 30 (6). p. 1210-1215. Includes references. (NAL Call No.: DNAL 64.8 C883).

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0248

**Enhanced predation by Orius insidiosus (Hemiptera: Anthocoridae) on larvae of Heliothis zea and Spodoptera frugiperda (Lepidoptera: Noctuidae) caused by prey feeding on resistant corn genotypes.**

EVETEX. Isenhour, D.J. Wiseman, B.R.; Layton, R.C. Lanham, Md. : Entomological Society of America. Prey feeding on resistant versus susceptible corn genotypes was investigated for its effect on predation by *Drius insidiosus* (Say). Fall armyworm, *Spodoptera frugiperda* (J.E. Smith), that fed on fresh foliage of the resistant corn genotype 'MpsWCB-4' suffered significantly higher rates of predation by adult *D. insidiosus* (Say) than did armyworm fed 'Cacahuacintle,' a susceptible genotype.

Similar results were obtained when corn earworm, *Heliothis zea* (Boddie), were fed a meridic diet containing silks from 'Zapalote Chico' compared with a diet without silks. A type II functional response was exhibited by *D. insidiosus* preying on fall armyworm but not on corn earworm. Feeding by corn earworm on meridic diets that contained resistant silks increased the age of the prey that were susceptible to attack by the predator.

Environmental entomology. June 1989. v. 18 (3). p. 418-422. Includes references. (NAL Call No.: DNAL QL461.E532).

resistance of populations WFISIHI, WFISILO and Cycles 0, 2, 4, and 5 of BS9 were evaluated in two environments in Wisconsin. Whorl composition was not related to changes in ECB resistance in any population. In BS9, leaf-sheath and stalk concentrations of neutral and acid detergent fiber, cellulose, and lignin increased linearly over selection cycles. In contrast, WFISIHI was as susceptible to second-generation ECB as WFISILO, suggesting that the responses in BS9 may be due to linkage or unintentional selection. Populations BS9, WFISIHI, and WFISILD, however, were derived from diverse sources, and it is likely that mechanisms for resistance differ for the three populations. Crop science. May/June 1990. v. 30 (3). p. 505-510. Includes references. (NAL Call No.: DNAL 64.8 C883).

0251

**Evaluating corn varieties for resistance to damage by blackbirds and starlings.**

Woronecki, P.P. Dolbeer, R.A.; Ditis, D.L. Philadelphia, PA : ASTM, c1988. Vertebrate pest control and management materials : 5th volume / Stephen A. Shumake and Roger W. Bullard, editors. p. 27-38. ill. Includes references. (NAL Call No.: DNAL SB993.4.V47).

0249

**Environmental protection agency gives tentative go-ahead to test genetically engineered pesticide.**

Meyer, E.L. Washington, D.C. : The Washington Post Co. The Washington post. Mar 30, 1988. p. A18. (NAL Call No.: DNAL A00069).

0252

**Evaluation of corn hybrids for resistance to insects.**

GARRA. Widstrom, N.W. McMillian, W.W.; Wiseman, B.R. Athens, Ga. : The Stations. Research report - University of Georgia, College of Agriculture, Agricultural Experiment Stations. Includes statistical data. Dec 1988. (565). p. 28-31. (NAL Call No.: DNAL S51.E22).

0250

**European corn borer resistance and cell wall composition of three maize populations.**

CRPSAY. Buendgen, M.R. Coors, J.G.; Grrombacher, A.W.; Russell, W.A. Madison, Wis. : Crop Science Society of America. Feeding activities of herbivorous insects are influenced by host plant nutritional quality. Improved insect resistance resulting from either natural or artificial selection may be due, in part, to changes in nutritive constituents of plants. The first objective of this study was to measure changes in detergent fiber, lignin, ash, and N concentrations in whorls, leaf-sheaths, and stalks of the BS9 maize (*Zea mays* L.) population across five cycles of selection for resistance to the European corn borer (ECB) *Ostrinia nubilalis* (Hubner). The second objective was to evaluate ECB resistance in the WFISIHI and WFISILO maize populations, which were developed for high and low concentrations, respectively, of indigestible plant constituents (acid detergent fiber, lignin, and silica) in the leaf sheath. Leaf-sheath composition for all five cycles of BS9 was measured in three environments in Iowa. Whorl, leaf-sheath and stalk composition, as well as first- and second-generation ECB

0253

**Evaluation of maize populations of broad genetic base for aflatoxin contamination in the field.**

Kang, M.S. Lillehoj, E.B.; Widstrom, N.W.; Cleveland, T.E. Baton Rouge, La. : The Department. Report of projects - Louisiana Agricultural Experiment Station, Department of Agronomy. 1988. p. 92-95. Includes references. (NAL Call No.: DNAL 100 L936).

0254

**Evaluation of potential problems in a changing agricultural system: nematode control in Hawaiian crops.**

PLDIDE. Schenck, S. Holtzmann, D.V. St. Paul, Minn. : American Phytopathological Society. Plant disease. Nov 1990. v. 74 (11). p. 837-843. ill. Includes references. (NAL Call No.: DNAL 1.9 P69P).

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0255

**Evaluation of tropical and subtropical corn lines for resistance to second-generation European corn borer (Lepidoptera: Pyralidae).**  
JEENAI. Kim, S.K. Guthrie, W.D.; Hallauer, A.R.; Russell, W.A.; Brewbaker, J.L.; Hong, C.S. Lanham, Md. : Entomological Society of America. Open-pedigree corn (*Zea mays L.*) inbred lines with tropical (38 lines), subtropical (55 lines), and temperature (27 lines) origins were evaluated for resistance to second-generation European corn borer. *Ostrinia nubilalis* Hubner. Five plants in each plot were infested during anthesis with 10 applications of 50 larvae or 500 per plant. Relative ratings for resistance were taken 50-60 d after anthesis based on a nine-point rating scale (1, no sheath collar feeding damage to 9, severe damage). Differences among mean resistant ratings of the 120 lines were significant; higher resistance was associated with lines having tropical and subtropical germplasm. Twenty-two lines had resistance ratings less than 3.5, and most included either tropical or subtropical germplasm. Resistant ratings were correlated significantly with days to anthesis and silking and plant and ear height. Transfer of the resistant genes from the tropical germplasm to temperate germplasm should be done with caution because of their sensitivity to photoperiodism. *Journal of economic entomology*. Aug 1989. v. 82 (4). p. 1245-1250. Includes references. (NAL Call No.: DNAL 421 J822).

0256

**Feeding responses of fall armyworm larvae on excised green and yellow whorl tissue of resistant and susceptible corn.**  
FETMA. Wiseman, B.R. Isenhour, D.J. Gainesville, Fla. : Florida Entomological Society. Florida entomologist. Paper presented at the "Fall Armyworm Symposium", 1988. Sept 1988. v. 71 (3). p. 243-249. ill. Includes references. (NAL Call No.: DNAL 420 F662).

0257

**Firms foresee high stakes in emerging biopesticide market.**

Twombly, R. Philadelphia, Pa. : Institute for Scientific Information. The scientist. July 9, 1990. v. 4 (14). p. 1, 8-9, 28. (NAL Call No.: DNAL Q1.S37).

0258

**Generation mean analysis for resistance in maize to the corn leaf aphid (Homoptera: Aphididae).**  
JEENAI. Bing, J.W. Guthrie, W.D. Lanham, Md. : Entomological Society of America. Corn leaf aphids *Rhopalosiphum maidis* (Fitch) can be a serious pest of maize, *Zea mays L.* Because very little is known about the genetics of corn leaf aphid resistance in maize, a generation mean analysis was conducted on nine

generations of maize P1, B96 (susceptible); P2, Mo17 (resistant); F1; F2; F3; BC1; BC2; BS1; and BS2 to determine the type of gene action involved. The model that included additive and dominant effects explained 64.8% of the total variation among generations, whereas the model that included additive, dominant, and epistatic effects did not significantly improve the fit. The estimate of the additive genetic effects was most important, indicating that several loci contributed resistance to the corn leaf aphid. Dominant genetic effects were significant, but not as important as additive effects. Residuals remaining after fitting for additive and dominance effects were significant, indicating that more complicated genetic mechanisms may be involved. *Journal of economic entomology*. June 1991. v. 84 (3). p. 1080-1082. Includes references. (NAL Call No.: DNAL 421 J822).

0259

**Genetic basis of resistance in maize to five maize dwarf mosaic virus strains.**  
CRPSAY. Louie, R. Findley, W.R.; Knoke, J.K.; McMullen, M.D. Madison, Wis. : Crop Science Society of America. Maize dwarf mosaic (MDM) is a widespread viral disease of maize (*Zea mays L.*) in the southern U.S. Corn Belt. An understanding of the genetics for resistance to maize dwarf mosaic virus (MDMV) will provide a rational basis for effective selection. Our objective was to determine the genetic basis of resistance in inbred Pa405 to Strains A, B, D, E, and F of MDMV by examining the association between host symptom responses, and chromosomal translocation and morphological or molecular markers. Twenty-six translocation markers and the morphological marker y1 were incorporated into inbred M14. Linkage relationships with molecular markers were determined by restriction fragment length polymorphism (RFLP) analysis, using molecular markers UMC85, BNL6.29, UMC59, and UMC21. The three approaches all indicated a gene or genes on either the short arm or the proximal region of the long arm (proximal to Y1) of Chromosome 6 in inbred Pa405 controlling resistance to all five strains of MDMV. *Crop science*. Jan/Feb 1991. v. 31 (1). p. 14-18. Includes references. (NAL Call No.: DNAL 64.8 C883).

0260

**Genetic diversity in field populations of *Cochliobolus carbonum* on corn in North Carolina.**

PHYTA. Leonard, K.J. Leath, S. St. Paul, Minn. : American Phytopathological Society. Mean frequencies of race 2 (round and oval lesions) and race 3 (long, linear lesions) among 314 isolates of *Cochliobolus carbonum* from corn leaves in 10 North Carolina fields were 0.80 and 0.20 in the western piedmont and 0.82 and 0.18 in eastern North Carolina. Even though races 2 and 3 occurred in the same fields, they were genetically distinct. There were clear distinctions in lesion types, which are polygenically inherited, and the frequencies of

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cycloheximide tolerance and ability to form pseudothecia differed significantly in the two races. Frequencies of race, mating type, ability to form pseudothecia and ascii with ascospores, and tolerance of cycloheximide and carboxin varied considerably from field to field, even within short geographical distances. This suggests that inoculum dispersal and gene flow among populations is restricted in *C. carbonum*. Calculations of Nei's genetic distances between field populations based on frequencies of these polymorphic traits were not correlated with geographical distance between fields, indicating that the traits are not good indicators of microevolutionary divergence between populations probably because the traits are not selectively neutral.  
*Phytopathology*. Nov 1989. v. 80 (11). p. 1154-1159. ill., maps. Includes references. (NAL Call No.: DNAL 464.8 P56).

0261

### The genetic of corn.

AGRYA. Coe, E.H. Jr. Neuffer, M.G.; Hoisington, D.A. Madison, Wis. : American Society of Agronomy. Agronomy. In the series analytic: Corn and Corn Improvement, Third Edition / edited by G.F. Sprague and J.W. Dudley. 1988. (18). p. 81-258. Includes references. (NAL Call No.: DNAL 4 AM392).

0262

### Genetic resistance of tropical corn inbreds to second-generation European corn borer (Lepidoptera: Pyralidae).

JEENAI. Kim, S.K. Hallauer, A.R.; Guthrie, W.D.; Barry, D.; Lamkey, K.R.; Hong, C.S. Lanham, Md. : Entomological Society of America. Diallel crosses among five resistant (Tz14, Narino330, Hi34, Hi29, Ant.C5) and four susceptible (Hi32, Tx601, B73, Oh43) maize, *Zea mays* L., inbreds were used to determine the genetic control of resistance to damage by second-generation European corn borer, *Ostrinia nubilalis* Hubner. The nine parents and their 36 crosses each received 10 applications of 50 larvae (500 larvae per plant). Six replications of five plants per plot were infested at anthesis. Visual ratings were taken of sheath and collar tissue 50 to 60 days after infestation based on a nine-point rating scale (1, no damage to 9, severe damage). Significant differences for resistance were observed among the nine parents and the 36 crosses. Ratings of individual crosses varied significantly and averaged 3.7 with range of 1.8 (Tz14 x Narino330) to 5.3 (B73 x Oh43). Heterotic effects for resistance of the 36 crosses averaged -19.5%, which was equivalent to a difference of 1.78 on the rating scale. General (GCA) and specific combining ability (SCA) mean squares were significant with GCA accounting for 82 and SCA for 18% of the total variation among crosses. Among the nine parents, four (Tz14, Narino330, Hi34, Ant.C5) showed greater GCA effects for resistance. *Journal of economic entomology*. Aug 1989. v. 82 (4). p. 1207-1211.

Includes references. (NAL Call No.: DNAL 421 J822).

0263

**Genetic studies of resistance in maize (*Zea mays* L.) to Goss's bacterial wilt and blight (*Clavibacter michiganense* ssp. *nebraskense*).** JOHEA. Rocheford, T.R. Gardner, C.O.; Vidaver, A.K. Washington, D.C. : American Genetic Association. *The Journal of heredity*. Sept/Oct 1989. v. 80 (5). p. 351-356. Includes references. (NAL Call No.: DNAL 442.8 AM3).

0264

**Genetics of reaction to maize dwarf mosaic virus strain A in several maize inbred lines.** PHYTA. Roane, C.W. Tolin, S.A.; Aycock, H.S. St. Paul, Minn. : American Phytopathological Society. Nine maize inbred lines resistant to maize dwarf mosaic virus strain A (MDMV-A) were studied in hybrid combinations for inheritance of reaction to MDMV-A in F1 and F2. Plants growing in a field free of natural inoculum were mechanically inoculated at the two- to four-leaf stage. Three to four weeks later they were scored as healthy or symptomatic in response to virus. This was done to detect early symptoms not always apparent after anthesis. After anthesis plants were scored again but on a scale of 1-7; 1 = no infection, and 7 = nearly completely mottled. Plants that had symptoms before but not after anthesis were scored 2. Resistant inbred line B68, Oh1EP, Oh7B, and Pa405 (the B68 group) behaved homogeneously for virus reactions as lines and the F1 of crosses with susceptible line Va50 produced only type 1 plants. In the F2, resistance was monogenic and completely dominant. Since no infected plants were observed in F2 of crosses of lines within the B68 group, resistance occurred at one locus. The symbol Rmd1 is suggested for this locus. The resistant inbred lines A239, Va53, Va85, and Va0M73 (the Va53 group) produced only type 1 plants, but in the F1 of crosses with Va50, produced some susceptible plants; however, in F2 all segregated monogenically. In the F2 of crosses within the Va53 group and between the Va53 and B68 groups, susceptible segregates appeared. However, since the Va53 group behaved variably in F1 combination with VAa50 it could not be ascertained that genes of the Va53 group were allelic with or different from the resistance gene of the B68 group. Va35 is unstable as a line and produced inconclusive results; in the F2 of Va50 X Va35, a 1:1 ratio was obtained instead of the expected 3:1. Inconclusive results were also obtained in the crosses Va35 X Pa405 and Va35 X A239. *Phytopathology*. Dec 1989. v. 79 (12). p. 1364-1368. Includes references. (NAL Call No.: DNAL 464.8 P56).

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0265

**Genetics of resistance in maize to a complex of three species of thrips (Thysanoptera: Thripidae).**

JEENAI. Bing, J.W. Dicke, F.F.; Guthrie, W.D. Lanham, Md. : Entomological Society of America. During summer 1988, a heavy infestation of thrips, *Anaphothrips obscurus* (Mueller), *Frankliniella fusca* (Hinds), and *F. tenuicornis* (Uzel) occurred on maize, *Zea mays* L., allowing for evaluation of resistance in 10 inbred maize lines. Thrips populations peaked at the end of June, and evaluations of the damage were taken at this time. Inbred 41:2504B had the smallest thrips population, B37 had the largest population, and Mo17, Ci03, and B73 were intermediate. A 10-inbred-line diallel cross, based on damage caused by leaf-feeding, showed that variations due to general combining ability (GCA) and specific combining ability (SCA) were highly significant. Variation due to GCA, however, was 14 times greater than that for SCA, indicating that additive genetic effects were more important than nonadditive effects. The inbred 41:2504B was the most resistant and best general combiner, whereas Ci03 was the most susceptible to thrips damage. *Journal of economic entomology*. Apr 1990. v. 83 (2). p. 621-624. Includes references. (NAL Call No.: DNAL 421 J822).

0266

**Genetics of resistance to aflatoxin contamination of maize with *Lfy* gene.**

Kang, M.S. Baton Rouge, La. : The Department. Report of projects - Louisiana Agricultural Experiment Station, Department of Agronomy. 1989. p. 78-79. Includes references. (NAL Call No.: DNAL 100 L936).

0267

**Growth and physiological responses of normal, dwarf, and albino corn (*Zea mays*) to clomazone treatments.**

PCPB. Vencill, W.K. Hatzios, K.K.; Wilson, H.P. Duluth, Minn. : Academic Press. Pesticide biochemistry and physiology. Sept 1989. v. 35 (1). p. 81-88. illl. Includes references. (NAL Call No.: DNAL SB951.P49).

0268

**Growth and survival of southwestern corn borer on whorl and reproductive stage plants of selected corn hybrids.**

SENTD. Davis, F.M. Williams, W.P.; Ng, S.S.; Videla, G.W. College Station, Tex. : Southwestern Entomological Society. The Southwestern entomologist. June 1991. v. 16 (2). p. 144-154. Includes references. (NAL Call No.: DNAL QL461.S65).

0269

**Herbicide-resistant plants: big market, and better weed control.**

GTNEEA. Fort Lee, N.J. : Technical Insights, Inc. Genetic technology news. May 1989. v. 9 (5). p. 8, 11. (NAL Call No.: DNAL QH442.G445).

0270

**Identification of a gene for resistance to wheat streak mosaic virus in maize.**

PHYTA. McMullen, M.D. Louie, R. St. Paul, Minn. : American Phytopathological Society. Wheat streak mosaic virus (WSMV) induces generalized mosaic symptoms in selected maize inbreds. During 1988 and 1989, WSMV was detected in many lines in our maize nursery. WSMV symptoms were associated with the expression of the polymitotic (po) marker in a B73 genetic background. The polymitotic locus is on the short arm of maize chromosome 6. An isolate of WSMV (WSMV-W) from naturally infected plants was used to rub-inoculate greenhouse-grown maize plants segregating (po/po or po/+)B73, and the symptom responses of these plants confirmed the presence of a gene linked to po that controlled resistance to WSMV. Restriction fragment length polymorphism (RFLP) analysis located this gene on either the short arm of chromosome 6 or on the long arm proximal to the RFLP marker locus UMC59. The symptom responses to inoculation with WSMV were also determined for F2 and backcross plants from crosses between the WSMV-resistant inbred Pa405 and the WSMV-susceptible inbred Oh28. The segregation ratios suggested the presence of multiple genes for resistance to WSMV in Pa405. RFLP analysis of plants from these crosses demonstrated that one gene for resistance in Pa405 was also located on chromosome 6. *Phytopathology*. June 1991. v. 81 (6). p. 624-627. Includes references. (NAL Call No.: DNAL 464.8 P56).

0271

**Identification of genes governing filamentous growth and tumor induction by the plant pathogen *Ustilago maydis*.**

PNASA. Banuett, F. Washington, D.C. : The Academy. Two master regulatory loci, a and b, govern life-cycle transitions of the phytopathogenic fungus *Ustilago maydis*. Fusion of haploids that differ at both a and b results in production of a filamentous dikaryon, which induces tumors in its host, maize. Here I describe identification of genes distinct from a and b that play roles in these life-cycle transitions. These studies identify three genes, fuz1, fuz2, and rtf1, that are necessary for filament formation. fuz1 is also necessary for normal size and distribution of tumors and for teliospore formation; fuz2 is also necessary for teliospore germination. Mutations in the rtf1 gene, which are recessive, bypass the requirement of different b alleles for tumor formation. This observation indicates that rtf1 codes for a negative regulator of tumor induction. The fuz1, fuz2, and rtf1 genes may be targets for the a and b loci.

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Proceedings of the National Academy of Sciences of the United States of America. May 1, 1991. v. 88 (9). p. 3922-3926. Includes references. (NAL Call No.: DNAL 500 N21P).

0272

**Identifying resistance in corn to corn earworm (Lepidoptera: Noctuidae) using a laboratory bioassay.**

Buckley, P.M. Davis, F.M.; Williams, W.P. Clemson, S.C. : South Carolina Entomological Society. Journal of agricultural entomology. Jan 1991. v. 8 (1). p. 67-70. Includes references. (NAL Call No.: DNAL SB599.J69).

0273

**Imidazolinone-induced loss of acetohydroxyacid synthase activity in maize is not due to the enzyme degradation.**

PLPBA. Shaner, D.L. Singh, B.K. Rockville, Md. : American Society of Plant Physiologists. Acetohydroxyacid synthase (AHAS), the first enzyme leading to the biosynthesis of valine, leucine, and isoleucine, is inhibited by different chemical classes of herbicides. There is a loss in the extractable AHAS activity in imidazolinone-treated plants. Immunological studies using a monoclonal antibody against AHAS revealed no degradation of AHAS protein in imidazolinone-treated maize (*Zea mays*) plants. Therefore, the loss in AHAS activity is not due to the loss of AHAS protein. Plant physiology. Dec 1991. v. 97 (4). p. 1339-1341. Includes references. (NAL Call No.: DNAL 450 P692).

0274

**Inbreeding depression and gene frequency changes for agronomic traits in corn synthetic selected for resistance to European corn borer.**  
Klenke, J.R. Russell, W.A.; Guthrie, W.D.; Smith, O.S. Clemson, S.C. : South Carolina Entomological Society. Journal of agricultural entomology. Oct 1988. v. 5 (4). p. 225-233. Includes references. (NAL Call No.: DNAL SB599.J69).

0275

**Incorporation of callus tissue into artificial diet as a means of screening corn genotypes of resistance to the fall armyworm and the corn earworm (Lepidoptera: Noctuidae).**

JKESA. Isenhour, D.J. Wiseman, B.R. Lawrence, Kan. : The Society. Journal of the Kansas Entomological Society. July 1988. v. 61 (3). p. 303-307. Includes references. (NAL Call No.: DNAL 420 K13).

0276

**Influence of maize pericarp surface relief on resistance to the maize weevil (Coleoptera: Curculionidae).**

JKESA. Tipping, P.W. Legg, D.E.; Rodriguez, J.G.; Poneleit, C.G. Lawrence, Kan. : The Society. Journal of the Kansas Entomological Society. Apr 1988. v. 61 (2). p. 237-241. ill. Includes references. (NAL Call No.: DNAL 420 K13).

0277

**Influence of susceptible and resistant maize accessions on the development of *Sitophilus zeamais* Motsch. (Coleoptera, Curculionidae) with initial feeding in specific kernel areas.**  
JKESA. Urrelo, R. Wright, V.F. Lawrence, Kan. : The Society. Journal of the Kansas Entomological Society. Jan 1989. v. 62 (1). p. 32-43. ill. Includes references. (NAL Call No.: DNAL 420 K13).

0278

**Inheritance of resistance in corn (*Zea mays*) to gray leaf spot.**  
PHYTAU. Huff, C.A. Ayers, J.E.; Hill, R.R. Jr. St. Paul, Minn. : American Phytopathological Society. Phytopathology. June 1988. v. 78 (6). p. 790-794. Includes references. (NAL Call No.: DNAL 464.8 P56).

0279

**Inheritance of resistance in whole kernel maize to oviposition by the maize weevil (Coleoptera: Curculionidae).**  
JEENAI. Tipping, P.W. Cornelius, P.L.; Legg, D.E.; Poneleit, C.G.; Rodriguez, J.G. Lanham, Md. : Entomological Society of America. Inheritance of resistance in maize, *Zea mays* L., to oviposition by the maize weevil, *Sitophilus zeamais* Motschulsky, was investigated by first crossing 10 inbred lines (A619, B37, B68, B73, H95, Mo17, N28, Pa91, R805, and T220) in all possible combinations (full diallel) in two environments (Florida and Kentucky). Resulting F1 seed was evaluated for resistance to the maize weevil. Remnant F1 seed was then planted, and the F2 seed was evaluated for resistance as before. A significant environmental influence occurred on the expression of resistance; maize grown in Florida was consistently more susceptible to maize weevil attack than that grown in Kentucky. Generally, however, the most resistant genotypes in one environment were among the most resistant in the other. Other findings indicated that general combining ability and, to a lesser extent, specific combining ability were important in the heritability of resistance to the maize weevil. A significant maternal effect occurred on resistance in the F1 but it generally was not present in the F2 seed. Conclusions are that, using these genotypes, development of hybrids

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with significant maize weevil resistance should be possible because the resistance factors were principally influenced by general combining ability and maternal effects were not expressed past the F1 generation. Journal of economic entomology. Oct 1989. v. 82 (5). p. 1466-1469. Includes references. (NAL Call No.: DNAL 421 J822).

0280

Inheritance of resistance of *Helminthosporium carbonum* race 3 in maize.

CRPSAY. Halseth, D.E. Pardee, W.D.; Viands, D.R. Madison, Wis. : Crop Science Society of America. Since the early 1970s, several reports of a new helminthosporium leafspot disease of maize (*Zea mays L.*) caused by *Helminthosporium carbonum* Ullstrup (syn. *Bipolaris zeicola* (Stout) Shoemaker) (telom. *Cochliobolus carbonum* Nelson) Race 3 indicate that it has become widespread in the eastern USA and can cause heavy yield losses. This pathogen inflicts a range of symptoms on maize, depending on pathogen isolate and host genotype, confounding the development of screening techniques to identify plant genotypes resistant to this pathogen. The objective of our study was to determine if adequate progress from selection for resistance could be accomplished against a range of polymorphic symptoms by a field breeding program. An eight-parent diallel analysis and a generation mean analysis were used to evaluate the potential for genetic improvement. Inbred maize parents (resistant A239, Ay499, Mo17, and R181; susceptible B8, Co109, W64A, and W182BN) and their F1's, F2's and backcrosses were grown in the field during two seasons and artificially inoculated. Lesion area was subjectively classified into a numerical disease rating scale. The results of the diallel analysis indicated that only general combining ability (GCA) effects, or additive genetic effects, were highly significant. The generation mean analysis confirmed that the additive component was the most important factor, accounting for 52 to 75% of the variation in the models. Dominance and digenic interaction components were occasionally significant. Broad-sense and narrow-sense heritabilities ranged from 58 to 77% and 57 to 67%, respectively, for two seasons. Field screening techniques to select inbred parents and to evaluate their progeny were found to be satisfactory, but growth chamber evaluations were not always an accurate or reliable predictor of field responses, particularly regarding intermediate disease reaction. Crop science. May/June 1991. v. 31 (3). p. 612-617. Includes references. (NAL Call No.: DNAL 64.8 C883).

0281

Inheritance of resistance to Goss's wilt in maize.

CRPSAY. Treat, C.L. Tracy, W.F.; Drolsom, P.N.; Coors, J.G. Madison, Wis. : Crop Science Society of America. Resistant genotypes are the best means of control for Goss's wilt (*Corynebacterium michiganense* ssp. *nebraskense* Schuster, Hoff, Mandel, and Lazar) of maize (*Zea mays L.*). The purpose of this study was to identify susceptible and resistant genotypes and to determine the inheritance of resistance to Goss's wilt using generation means analysis and diallel experiments. Thirty-nine inbred lines were screened for resistance to Goss's wilt. Sixteen were susceptible, 15 intermediate, and 8 resistant. Four experiments, two generation mean analyses (GMA), and two diallels were used to investigate the inheritance of Goss's wilt. One GMA experiment consisted of the resistant inbred Mo17Ht, the susceptible inbred A634Ht, the F1, F2, and the F1 backcrossed to both parents. A second GMA experiment involved resistant Mo17Ht, susceptible CM105, the F1, F2, and the F1 backcrossed to both parents. One diallel had five parents and one six. Additive gene action was important in the generation mean analyses for resistance to Goss's wilt. Year effects and the generations X years interaction were highly significant. In the diallel experiments, general combining ability was highly significant for both, demonstrating the importance of additive gene effects. General combining ability and specific combining ability sums of squares accounted for 97.7 and 2.3% of the variation among crosses, respectively, in the first diallel, and for 91.0 and 9.0% in the second diallel. The results suggest that recurrent selection should be effective among the maize lines tested for resistance to Goss's wilt in maize. Crop science. July/Aug 1990. v. 30 (4). p. 893-896. Includes references. (NAL Call No.: DNAL 64.8 C883).

0282

Inheritance of resistance to gray leaf spot of corn.

CRPSAY. Elwinger, G.F. Johnson, M.W.; Hill, R.R. Jr.; Ayers, J.E. Madison, Wis. : Crop Science Society of America. Host plant resistance can play an important role in reducing the severity of gray leaf spot (caused by *Cercospora zeae-maydis* Tehon & Daniels) on corn (*Zea mays L.*). Inheritance of resistance was studied using four generations (inbred, single cross, F2, and backcross) produced from inbred lines PA875, VA59, B68Ht, H93, PA887P, and PA76-22. Four weekly estimates of percent leaf area affected were made on experiments planted at Shenandoah County, Virginia, and Franklin County, Pennsylvania. Disease progress curves were estimated for each genotype using orthogonal polynomial regression. There were significant differences ( $P < 0.05$ ) among genotypes for the mean, linear, and quadratic regression response effects within the inbred, single cross, and backcross generations and for the mean response effect within the F2

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generation. No differences were detected among cubic effects in any of the generations. General combining ability (GCA) and specific combining ability (SCA) mean squares were significant ( $P < 0.01$ ) for mean and linear response effects in diallel analyses of single crosses; GCA sums of squares were from 1.8 to 11.5 times larger than SCA sums of squares for these effects. Prediction of single cross performance using information from per se evaluation of inbreds resulted in  $r^2$  values of 0.55 to 0.67 for mean response effects and 0.33 to 0.45 for linear response effects. Prediction of backcross performance using information from diallel analyses resulted in  $r^2$  values of 0.81 to 0.90 for mean response effects and 0.61 to 0.89 for linear response effects. Regression of area under the disease progress curve data onto two models based on complete dominance indicated that dominance was important. For the genotypes studied, a model more complex than simple additivity was required to fully explain inheritance of resistance to gray leaf spot; however, screening of inbreds prior to testing them for combining ability should be effective in eliminating those that are most. Crop science. Mar/Apr 1990. v. 30 (2). p. 350-358. Includes references. (NAL Call No.: DNAL 64.8 C883).

### 0283

**Inhibition of corn callus growth by *Helminthosporium carbonum* Race 1 toxin.**  
CRPSAY. Wolf, S.J. Earle, E.D. Madison, Wis. : Crop Science Society of America. Plant tissue culture has potential application in the development of disease-resistant crops and also in the study of host-pathogen interactions in vitro. Pathogen-produced toxins (phytotoxins) can be used as pathogen surrogates in such work. *Helminthosporium carbonum* Race 1, the causal agent for *Helminthosporium* leaf spot of corn (*Zea mays* L.), produces a phytotoxin (HC toxin) known to be the pathogenicity factor for that disease. Tissue cultures were established from corn genotypes susceptible or resistant to *H. carbonum* Race 1. A toxin preparation with an effective dose (ED<sub>50</sub>) of 2 micrograms mL<sup>-1</sup> for seedling roots was incorporated into callus growth and regeneration media. Growth of callus derived from genotypes susceptible to the pathogen was inhibited at 5 micrograms mL<sup>-1</sup> toxin, whereas callus from a resistant genotype was inhibited only at 50 micrograms mL<sup>-1</sup> toxin. Regeneration of plants from callus of susceptible genotypes was also inhibited at 5 micrograms mL<sup>-1</sup> toxin, but regeneration of a resistant genotype was not inhibited at 20 micrograms mL<sup>-1</sup> toxin. A total of 5676 calli from the susceptible lines were exposed to toxin concentrations of 2, 5, and 10 micrograms mL<sup>-1</sup>. Both 3 and 15-mo old calli were used. Some cultures were treated with the mutagens sodium azide and ethyl methane sulfonate before exposure to toxin. No resistant callus or plants were recovered from any of the treatments. Failure to recover resistant callus might be due to an inability to identify resistant cells within a relatively slow-growing callus population. Crop science. May/June 1990. v. 30 (3). p. 728-734. Includes

references. (NAL Call No.: DNAL 64.8 C883).

### 0284

**Insect screening results: evaluation of corn hybrids for resistance to insects.**  
GARRA. Widstrom, N.W. McMillian, W.W.; Wiseman, B.R. Athens, Ga. : The Stations. Research report - University of Georgia, College of Agriculture, Agricultural Experiment Stations. Nov 1989. (585). p. 26-29. (NAL Call No.: DNAL S51.E22).

### 0285

**Intra- and interclonal competition in the cleistogamous grass *Amphibromus scabivalvis*.**  
AJBOAA. Cheplick, G.P. Salvador, G.M. Columbus, Ohio : Botanical Society of America. The relationship of differences in life history traits among genotypes to competitive ability is not well known for most clonal plants. It has been hypothesized that genetically identical clones will compete more intensively than genetically distinct clones. The perennial grass *Amphibromus scabivalvis*, which produces basal corns and cleistogamous seeds enclosed by leaf sheaths, exhibits pronounced clonal growth via rhizome and ramet production. In a controlled greenhouse experiment, clones of four genotypes of this species were grown under three regimes: alone in the absence of competition, paired with a clone of the same genotype (intraclonal competition), and paired with a clone of a different genotype (interclonal competition). There were differences in some biomass measures and in ramet and corn production among the four genotypes grown in the absence of competition. All genotypes showed a significant reduction in total biomass under both intra- and interclonal conditions, indicating that competition had occurred. For three of four genotypes, biomass allocation to corn increased under competition, while allocation to cleistogamous seeds was constant or increased slightly. Although some genotypes in specific interclonal combinations were less affected by competition than in intraclonal combinations, there was no support for the contention that the effects of competition were more intense for genetically identical clones. American journal of botany. Nov 1991. v. 78 (11). p. 1494-1502. Includes references. (NAL Call No.: DNAL 450 AM36).

### 0286

**Intron conservation across the prokaryote-eukaryote boundary: structure of the nuclear gene for chloroplast glyceraldehyde-3-phosphate dehydrogenase from maize.**  
PNASA. Quigley, F. Martin, W.F.; Cerff, R. Washington, D.C. : The Academy. Proceedings of the National Academy of Sciences of the United States of America. Apr 1988. v. 85 (8). p. 2672-2676. Includes references. (NAL Call No.: DNAL 500 N21P).

## (PLANT BREEDING)

0287

### Involvement of an inhibitory compound to induced resistance of maize to *Helminthosporium carbonum*.

PHYTA. Cantone, F.A. Dunkle, L.D. St. Paul, Minn. : American Phytopathological Society. In maize, resistance to *Helminthosporium carbonum* race 1 is induced by prior inoculation with race 2. This induced resistance was consistently associated with the production of a compound(s), which reversibly inhibited conidial germination and germ tube elongation. It also prevented growth of phytopathogenic bacteria in a defined medium. The inhibitor was produced and diffused into liquid on the surface of the leaf in all maize lines tested and in response to inoculation with other fungi. When this inhibitory diffusate was added to the conidial inoculum, lesions did not develop on leaves of susceptible genotypes. The host-specific toxin (HC-toxin) produced only by race 1 prevented the synthesis or release of the inhibitor but did not affect its activity in germination bioassays or its ability to prevent lesion development. The results suggest that the inhibitor has a role in induced resistance. *Phytopathology*. Nov 1990. v. 80 (11). p. 1225-1230. illl. Includes references. (NAL Call No.: DNAL 464.8 P56).

0288

### Killer corn fights back.

Englewood, N.J. : Technical Insights, Inc. Industrial bioprocessing. Dec 1991. v. 13 (12). p. 2. (NAL Call No.: DNAL TP360.B562).

0289

### Laboratory and field resistance to the European corn borer in maize germplasm.

CRPSAY. Reid, L.M. Arnason, J.T.; Nozzolillo, C.; Hamilton, R.I. Madison, Wis. : Crop Science Society of America. There is a continuing need to screen maize (*Zea mays L.*) germplasm for sources of resistance to the European corn borer, *Ostrinia nubilalis* (Hubner). This study was conducted to determine the resistance characteristics to a univoltine strain of the European corn borer of six groups of maize germplasm and to examine the relationship among resistance characteristics. The groups of germplasm consisted of (i) a latitudinal series of inbred lines; (ii) a set of the indigenous landraces of Mexico; (iii) two Argentine landraces; (iv) three Canadian synthetic populations; (v) three international Maize and Wheat Improvement Center (CIMMYT) maize pools; and (vi) two inbred lines used as controls. In addition, a multiple borer resistance population was studied. All germplasm was evaluated for seedling DIMBOA 2,4-dihydroxy-7-methoxy(2H)-1,4-benzoxazin-3(-4H)-one content, susceptibility to leaf-feeding (both laboratory and field) and to stalk tunneling by the European corn borer, susceptibility to *Gibberella zae* (Schwein.) Petch (stalk rot) and *Ustilago zae* (Beckm.) Unger (corn smut), and their ability to mature

in the climatic conditions prevailing at Ottawa, ON. The inbred lines were characterized by high resistance to leaf feeding, but susceptibility to stalk tunneling, whereas the indigenous Mexican landraces were susceptible to leaf feeding. Many significant correlations were found among the various parameters, including validation of the relation of seedling DIMBOA levels and laboratory leaf-feeding tests with the field resistance to European corn borer. This study confirms the importance of examining broad groups of germplasm when searching for sources of resistance to the European corn borer. *Crop science*. Nov/Dec 1991. v. 31 (6). p. 1496-1502. Includes references. (NAL Call No.: DNAL 64.8 C883).

0290

### Laboratory bioassay for resistance in corn to fall armyworm (*Lepidoptera: Noctuidae*) and southwestern corn borer (*Lepidoptera: Pyralidae*).

JEENAI. Williams, W.P. Buckley, P.M.; Hedin, P.A.; Davis, F.M. Lanham, Md. : Entomological Society of America. Inbred lines of corn, *Zea mays L.*, were evaluated for resistance to leaf feeding by the fall armyworm, *Spodoptera frugiperda* (J. E. Smith), and southwestern corn borer, *Diatraea grandiosella* Dyar, in field and laboratory experiments. For the laboratory bioassays, diets were prepared from lyophilized whorl tissue of field grown plants of resistant and susceptible corn inbred lines. To prepare the diets, 11 g lyophilized tissue was stirred into a mixture of 250 ml distilled water, 2 g agar, 12.5 mg gentamicin sulfate, 132 mg sorbic, and 528 mg ascorbic acid that had been heated to 82 degrees C and poured into 30-ml plastic cups. Cups were infested with two neonate larvae each. Fall armyworm larvae reared for 10 d on diets containing tissue of resistant inbred lines weighed 60% less than those reared on diets containing susceptible inbred tissue. Southwestern corn borer larvae reared for 14 d on whorl tissue from resistant inbred lines weighed 50% less than those reared on susceptible tissue. The laboratory bioassay satisfactorily differentiated among resistant and susceptible corn inbreds. *Journal of economic entomology*. Aug 1990. v. 83 (4). p. 1578-1581. Includes references. (NAL Call No.: DNAL 421 J822).

0291

### Mechanism of resistance to terbinafine in two isolates of *Ustilago maydis*.

PCPB. Orth, A.B. Henry, M.U.; Sisler, H.D. Duluth, Minn. : Academic Press. *Pesticide biochemistry and physiology*. June 1990. v. 37 (2). p. 182-191. Includes references. (NAL Call No.: DNAL SB951.P49).

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0292

**A microtechnique for antibiosis evaluations against the corn earworm.**

JKESA. Wiseman, B.R. Isenhour, D.J. Lawrence, Kan. : The Society. Journal of the Kansas Entomological Society. Apr 1991. v. 64 (2). p. 146-151. Includes references. (NAL Call No.: DNAL 420 K13).

0293

**Mutations in the maize mitochondrial T-urf13 gene eliminate sensitivity to a fungal pathotoxin.**

PNASA. Braun, C.J. Siedow, J.N.; Williams, M.E.; Levings, C.S. III. Washington, D.C. : The Academy. Proceedings of the National Academy of Sciences of the United States of America. June 1989. v. 86 (12). p. 4435-4439. ill. Includes references. (NAL Call No.: DNAL 500 N21P).

0294

**New line of inbred corn might help those who otherwise would lose crop.**

Barbour, F. Durham, N.C. : Durham Herald Co., Inc. Durham morning herald. Apr 23, 1990. p. B5. (NAL Call No.: DNAL A00063).

0295

**Orientation of the European corn borer within the maize plant.**

JKESA. Barry, D. Mends-Cole, M. Lawrence, Kan. : The Society. Journal of the Kansas Entomological Society. Apr 1991. v. 64 (2). p. 179-184. Includes references. (NAL Call No.: DNAL 420 K13).

0296

**Oviposition performance of *Sitophilus zeamais* Motsch. (Coleoptera: Curculionidae) on resistant and susceptible maize accessions.**

JKESA. Urrelo, R. Wright, V.F. Lawrence, Kan. : The Society. Journal of the Kansas Entomological Society. Jan 1989. v. 62 (1). p. 23-31. ill. Includes references. (NAL Call No.: DNAL 420 K13).

0297

**Oviposition preference by the sugarcane borer (Lepidoptera: Pyralidae).**

JEENAI. Sosa, O. Jr. Lanham, Md. : Entomological Society of America. Oviposition preference by the sugarcane borer, *Diatraea saccharalis* (F.), on several hosts was compared. The sugarcane borer laid significantly more eggs (78%) on four sugarcane (*Saccharum* spp.) clones than on corn (*Zea mays* L.), sorghum (*Sorghum bicolor* (L.) Moench), rice (*Oryza sativa* L.), or wax paper (22%).

More eggs were laid on the leaf surfaces of glabrous sugarcane clones than on a pubescent clone. Although fewer eggs were laid on the leaf surfaces of pubescent clones, oviposition on the midribs (devoid of trichomes) was increased compared with oviposition on the midrib of glabrous clones; this result indicated also that moths avoided pubescent surfaces for oviposition. Overall, the glabrous clones received >2.5 times the number of eggs than the pubescent clone. A commercial sugarcane clone with pubescence might therefore be more resistant to the sugarcane borer than the glabrous clones that are currently grown. Journal of economic entomology. June 1990. v. 83 (3). p. 866-868. Includes references. (NAL Call No.: DNAL 421 J822).

0298

**Ovipositional response of southwestern corn borer (Lepidoptera: Pyralidae) and fall armyworm (Lepidoptera: Noctuidae) to selected maize hybrids.**

JEENAI. Ng, S.S. Davis, F.M.; Williams, W.P. Lanham, Md. : Entomological Society of America. Field cage experiments were done to determine if maize (*Zea mays* L.) hybrids with leaf-feeding resistance to larvae of southwestern corn borer, *Diatraea grandiosella* Dyar, and fall armyworm, *Spodoptera frugiperda* (J. E. Smith), also are less preferred for oviposition under choice conditions. Two resistant maize hybrids (Mp496 X Mp701 and Mp704 X Mp706) and two susceptible hybrids (SC229 X Tx601 and Ab24E X Va35) were tested. Southwestern corn borers laid significantly fewer eggs on the resistant than on the susceptible hybrids. Fall armyworms laid significantly fewer eggs on the resistant hybrids than on SC229 X Tx601 but not on Ab24E X Va35. Thus, females of both species exhibited preference in selection of hosts for oviposition with the resistant hybrids being less preferred. Journal of economic entomology. Aug 1990. v. 83 (4). p. 1575-1577. Includes references. (NAL Call No.: DNAL 421 J822).

0299

**Patenting genes that encode agriculturally important traits.**

Bent, S.A. Madison, Wis. : The Society. ASA special publication - American Society of Agronomy. 1989. (52). p. 109-122. Includes references. (NAL Call No.: DNAL 64.9 AM3).

0300

**Performance of field corn hybrids in South Carolina, 1988.**

McClain, E.F. Zublena, J.P.; Barefield, D.K.; Chrestman, R.E. Clemson, S.C. : The Service. Circular - Clemson University, Cooperative Extension Service. Includes statistical data. Dec 1988. (193,rev.). p. 47 p. maps. (NAL Call No.: DNAL 275.29 S08E).

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0301

**Performance of maize inbred line DE811 in hybrid combinations: resistance to first- and second-generation European corn borers (Lepidoptera: Pyralidae).**  
JENAI. Guthrie, W.D. Hawk, J.A.; Jarvis, J.L. Lanham, Md. : Entomological Society of America. Inbred line DE811 was crossed with 12 dent maize, Zea mays L., inbred lines. The 12 inbred lines, plus DE811 and a check inbred line, and 12 single crosses, plus two single-cross checks, were planted in a modified randomized block design for 3 yr, with five replications each year. First-generation European corn borer, *Ostrinia nubilalis* Hubner, plots were separate from the second-generation European corn borer plots (two hills of three plants for each plot in each experiment). Plants in the first-generation tests were infested during the midwhorl stage of plant development, whereas plants in the second-generation tests were infested during anthesis. Plants in each test were infested with 12 egg masses (300 eggs) per plant in six applications of two masses, spaced 1 d apart. Leaf-feeding ratings in the first-generation tests were made 3 wk after egg hatch. Sheath-collar feeding ratings and stalk damage were made 60 d after egg hatch in the second-generation tests. In combination with several susceptible inbred lines, DE811 resistance showed partial dominance for resistance to leaf feeding by first-generation European corn borers and for resistance to sheath-collar feeding and stalk damage by second-generation European corn borers. Single crosses of DE811 X resistant inbred lines had high resistance to both European corn borer generations. Journal of economic entomology. Dec 1989. v. 82 (6). p. 1804-1806. Includes references. (NAL Call No.: DNAL 421 J822).

0302

**Pest Control in Arkansas cereal crops through genetic resistance.**

AKFRAC. Bacon, R.K. Moldenhauer, K.A.K.; York, J.O. Fayetteville, Ark. : The Station. Arkansas farm research - Arkansas Agricultural Experiment Station. May/June 1990. v. 39 (3). p. 8. ill. (NAL Call No.: DNAL 100 AR42F).

0303

**Photoregulation of the Cat2 and Cat3 catalase genes in pigmented and pigment-deficient maize: the circadian regulation of Cat3 is superimposed on its quasi-constitutive expression in maize leaves.**

GENTA. Acevedo, A. Williamson, J.D.; Scandalios, J.G. Baltimore, Md. : Genetics Society of America. We have investigated the accumulation of Cat2 and Cat3 catalase transcripts in 6-7-day postimbibition leaves of normally pigmented and pigment-deficient maize seedlings under different light/dark regimes. In seedlings of normal inbred maize lines, Cat2 levels in either continuous light or a diurnal light/dark cycle than in continuous dark. In

contrast to the high levels of the Cat2 message observed in their wild-type siblings, carotenoid-deficient mutants accumulate Cat2 mRNA at barely detectable levels. Mutants deficient in chlorophylls, but having normal carotenoid levels, accumulate normal levels of Cat2 mRNA. This suggests that both light and carotenoids are required for the normal accumulation of the Cat2 message. The steady-state level of Cat3 RNA exhibits a dramatic diurnal variation when seedlings are grown under a 24-hr light/dark cycle. We have previously shown that this variation is at the level of Cat3 gene transcription and is under the control of a novel circadian rhythm. In this study we show that both pigment-deficient mutants and their wild-type siblings exhibit the normal diurnal pattern of Cat3 RNA accumulation. This indicates that photosynthetic pigments, allelic variation, and genetic background do not directly affect the temporal pattern of Cat3 accumulation in leaves. We observed, however, that when normal plants are grown in either continuous light or continuous dark, the Cat3 transcript in leaves is present at uniformly high levels throughout the 24-hr sampling period. Because the Cat3 gene is continually transcribed in leaves in the absence of a cyclic light regime, the normally observed diurnal variation of Cat3 gene expression is apparently the result of a circadian-regulated transcriptional repressor. Genetics. Mar 1991. v. 127 (3). p. 601-607. ill. Includes references. (NAL Call No.: DNAL 442.8 G28).

0304

**Pioneer scientists achieve stable corn transformation: "particle gun" makes it possible.**

Nepean, Ont. : Winter House Scientific Publications. New biotech business Canada. Oct 1, 1990. v. 2 (22). p. 2. (NAL Call No.: A00051).

0305

**Plant biotechnologists tell AAAS meeting of transforming corn, cotton.**

New York : McGraw-Hill. Biotechnology newswatch. Feb 6, 1989. v. 9 (3). p. 5. (NAL Call No.: DNAL TP248.13.B54).

0306

**Plant damage and survival of European corn borer (Lepidoptera: Pyralidae) larvae reared for 22 years on resistant and susceptible inbred lines of maize.**

JKESA. Guthrie, W.D. Jarvis, J.L. Lawrence, Kan. : The Society. Journal of the Kansas Entomological Society. Jan 1990. (63). p. 193-195. Includes references. (NAL Call No.: DNAL 420 K13).

(PLANT BREEDING)

0307

**Plant grows own pesticide.**

NYTIAO. New York, N.Y. : H.J. Raymond & Co. . The New York times. Jan 4, 1989. p. 27. (NAL Call No.: DNAL 286.8 N488).

0308

**Plant resistance to insects attacking corn and grain sorghum.**

FETMA. Wiseman, B.R. Davis, F.M. Gainesville, Fla. : Florida Entomological Society. Florida entomologist. Sept 1990. v. 73 (3). p. 446-458. Includes references. (NAL Call No.: DNAL 420 F662).

0309

**Plant variety protection, private funding, and public sector research priorities.**

Knudson, M.K. Pray, C.E. Ames, Iowa : American Agricultural Economics Association. American journal of agricultural economics. Paper presented at AAEA Annual Meeting, August 4-7, 1991, Manhattan, Kansas. Discussions by: J.H. Reilly, p. 898-900; M.E. Walsh, p. 901-902; and J.F. Oehmke, p. 903-904. Aug 1991. v. 73 (3). p. 882-886. Includes references. (NAL Call No.: DNAL 280.8 J822).

0310

**Roast-tolerant corn yields unexpected payoffs.**

MINSB. Brungardt, S. St. Paul, Minn. : The Station. Minnesota science - Agricultural Experiment Station, University of Minnesota. Winter 1990. p. 4-5. ill. (NAL Call No.: DNAL 100 M668).

0311

**Preharvest kernel infection by Aspergillus flavus for resistant and susceptible maize hybrids.**

CRPSAY. Scott, G.E. Zummo, N. Madison, Wis. : Crop Science Society of America. Kernel infection of maize, Zea mays L., by Aspergillus flavus Link ex Fr. and subsequent aflatoxin production is a frequent and serious problem in the southeastern USA. Some maize inbreds with resistance to kernel infection by A. flavus in the field have been identified. The objective of this study was to compare the level of kernel infection by A. flavus for 15 crosses among six resistant inbreds with 15 crosses among six susceptible inbreds. The top ear of each plant was inoculated with the fungal spores using the pinbar inoculation technique. Crosses among resistant inbreds averaged 16.6% infected kernels compared with 30.4% for hybrids among susceptible inbreds during 2 yr of testing. Thus, incidence of A. flavus kernel infection in resistant crosses was 45% less than for hybrids of susceptible inbreds. Crop science. Mar/Apr 1990. v. 30 (2). p. 381-383.

Includes references. (NAL Call No.: DNAL 64.8 C883).

0312

**Production of hybrid seed corn.**

AGRYA. Wych, R.D. Madison, Wis. : American Society of Agronomy. Agronomy. In the series analytic: Corn and Corn Improvement, Third Edition / edited by G.F. Sprague and J.W. Dudley. 1988. (18). p. 565-605. ill. Includes references. (NAL Call No.: DNAL 4 AM392).

0313

**Reaction of two maize synthetics to anthracnose stalk rot and northern corn leaf blight following recurrent selection for resistance to Diplodia stalk rot and European corn borer.**

PHYTAJ. Nyhus, K.A. Russell, W.A.; Guthrie, W.D.; Martinson, C.A. St. Paul, Minn. : American Phytopathological Society. Two maize (*Zea mays*) synthetics, BSAA and BSBB, were recurrently selected for resistance to *Diplodia* (*Diplodia maydis*) stalk rot (DSR) and leaf feeding caused by the first-generation European corn borer (*Ostrinia nubilalis*) (ECB), based on the reaction of Si lines to artificial inoculations of *D. maydis* and artificial infestations of the ECB. This study was conducted to determine if plant factors contributing to DSR and ECB resistance also conferred resistance to anthracnose stalk rot (ASR) caused by *Colletotrichum graminicola* and northern corn leaf blight (NLB) caused by *Exserohilum turcicum*. Highly significant linear improvements in ASR resistance were observed over cycles (C0 to C4) of selection in both synthetics. These improvements mirrored the gains reported previously for DSR resistance in BSAA and BSBB and suggested that a genetic correlation exists between DSR resistance and ASR resistance in these populations. NLB severity ratings were recorded on six dates throughout the growing season. A natural logarithm transformation was used to describe the disease progress curve for each of the C0 to C4 populations of each synthetic. Linear regression of lnNLB ratings on lnDATE (days after inoculation) accounted for more than 97% of the variation among entries when averaged over replications. Our results showed no concomitant improvement in NLB resistance over cycles of selection for ECB resistance, contradicting previous reports that 2,4-dihydroxy-7-methoxy-2H-1,4-benzoxazin-3-one (DIMBOA), a known biochemical factor in leaf-feeding resistance, confers resistance to NLB. Phytopathology. Feb 1989. v. 79 (2). p. 166-169. Includes references. (NAL Call No.: DNAL 464.8 P56).

(PLANT BREEDING)

0314

**Reduction of European corn borer (Lepidoptera: Pyralidae) damage by intercropping corn with soybean.**  
JEENAI. Martin, R.C. Arnason, J.T.; Lambert, J.D.H.; Isabelle, P.; Voldeng, H.D.; Smith, D.L. Lanham, Md. : Entomological Society of America. Corn, Zea mays L., and soybean, Glycine max (L.) Merrill, were intercropped for silage in 1985 and 1986 at the Central Experimental Farm, Ottawa, to determine effects on yields and the percentage of European corn borer, Ostrinia nubitalis Hubner, infestation. A 2 x 2 x 3 factorial was analyzed with two corn hybrids (dwarf PAG 391134 and tall Coop S259), two corn cropping systems (monocropped and intercropped), and three nitrogen fertilizer levels (0, 60, and 120 kg N/ha). Intercropping significantly reduced European corn borer infestation in tall corn in 1985 and in both corn hybrids in 1986. Dwarf corn was infested significantly less than tall corn in both years and in both cropping systems. The commonly applied rate of 120 kg N/ha resulted in the highest European corn borer infestation. Yields and land equivalent ratios at 60 kg N/ha were as high as those at 120 kg N/ha, but European corn borer infestation was significantly less at 60 kg N/ha. Application of 0 kg N/ha resulted in the lowest yields and land equivalent ratios, but European corn borer infestation was not different from levels at 60 kg N/ha. Journal of economic entomology. Oct 1989. v. 82 (5). p. 1455-1459. Includes references. (NAL Call No.: DNAL 421 J822).

0315

**Registration of BS17(CB)C4 and BS16(CB)C4 maize germplasm.**  
CRPSAY. Russell, W.A. Guthrie, W.D. Madison, Wis. : Crop Science Society of America. Crop science. Jan/Feb 1991. v. 31 (1). p. 238-239. Includes references. (NAL Call No.: DNAL 64.8 C883).

0316

**Registration of B96 germplasm line of maize.**  
CRPSAY. Guthrie, W.D. Russell, W.A.; Bing, J.W.; Dicke, F.F. Madison, Wis. : Crop Science Society of America. Crop science. Jan/Feb 1991. v. 31 (1). p. 239-240. Includes references. (NAL Call No.: DNAL 64.8 C883).

0317

**Registration of eight maize germplasm sources for gray leaf spot (GLS) resistance.**  
CRPSAY. Johnson, M.W. Ayers, J.E. Madison, Wis. : Crop Science Society of America. Crop science. Sept/Oct 1988. v. 28 (5). p. 871-872. Includes references. (NAL Call No.: DNAL 64.8 C883).

0318

**Registration of GT-DDSA (C5) and GT-DDSB (C5) maize germplasms.**  
CRPSAY. Widstrom, N.W. Wiseman, B.R.; McMillian, W.W. Madison, Wis. : Crop Science Society of America. Crop science. Nov/Dec 1988. v. 28 (6). p. 1036-1037. Includes references. (NAL Call No.: DNAL 64.8 C883).

0319

**Registration of KyWVS and KyYVS maize germplasm.**  
CRPSAY. Poneleit, C.G. Evans, K.O.; Loeffel, F.A. Madison, Wis. : Crop Science Society of America. Crop science. May/June 1990. v. 30 (3). p. 756-757. Includes references. (NAL Call No.: DNAL 64.8 C883).

0320

**Registration of maize germplasms FS8A(S), FS8A(T), FS8B(S), and FS8B(T).**  
CRPSAY. Horner, E.S. Madison, Wis. : Crop Science Society of America. Crop science. July/Aug 1990. v. 30 (4). p. 964. Includes references. (NAL Call No.: DNAL 64.8 C883).

0321

**Registration of Mp313E parental line of maize.**  
CRPSAY. Scott, G.E. Zummo, N. Madison, Wis. : Crop Science Society of America. Crop science. Nov/Dec 1990. v. 30 (6). p. 1378. Includes references. (NAL Call No.: DNAL 64.8 C883).

0322

**Registration of Mp708 germplasm line of maize.**  
CRPSAY. Williams, W.P. Davis, F.M.; Windham, G.L. Madison, Wis. : Crop Science Society of America. Crop science. May/June 1990. v. 30 (3). p. 757. Includes references. (NAL Call No.: DNAL 64.8 C883).

0323

**Registration of NC264 parental line of maize.**  
CRPSAY. Sisco, P.H. Goodman, M.M.; Thompson, D.L. Madison, Wis. : Crop Science Society of America. Crop science. Jan/Feb 1989. v. 29 (1). p. 248. Includes references. (NAL Call No.: DNAL 64.8 C883).

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0324

**Registration of nine maize germplasm populations.**

CRPSAY. Eberhart, S.A. Briggs, R.W.; Raycraft, J.; Linder, J.O. Madison, Wis. : Crop Science Society of America. *Crop science*. Jan/Feb 1989. v. 29 (1). p. 243-244. Includes references. (NAL Call No.: DNAL 64.8 C883).

0325

**Registration of PA356, PA376 and PA891 parental lines of maize.**

CRPSAY. Johnson, M.W. Madison, Wis. : Crop Science Society of America. *Crop science*. Sept/Oct 1989. v. 29 (5). p. 1333-1334. (NAL Call No.: DNAL 64.8 C883).

0326

**Registration of RBS10 (S1 + HS) C3 corn germplasm.**

CRPSAY. Lambert, R.J. Madison, Wis. : Crop Science Society of America. *Crop science*. Nov/Dec 1989. v. 29 (6). p. 1580. Includes references. (NAL Call No.: DNAL 64.8 C883).

0327

**Registration of RTx2858 MDMV-A resistant germplasm.**

CRPSAY. Miller, F.R. Toler, R.W. Madison, Wis. : Crop Science Society of America. *Crop science*. May/June 1990. v. 30 (3). p. 764. Includes references. (NAL Call No.: DNAL 64.8 C883).

0328

**Registration of SD101 parental line of maize.**

CRPSAY. Wicks, Z.W. III. Smolik, J.D.; Carson, M.L.; Scholten, G.G. Madison, Wis. : Crop Science Society of America. *Crop science*. Jan/Feb 1990. v. 30 (1). p. 242. Includes references. (NAL Call No.: DNAL 64.8 C883).

0329

**Registration of SD102 and SD103 parental lines of maize.**

CRPSAY. Wicks, Z.W. III. Smolik, J.D.; Carson, M.L.; Scholten, G.G. Madison, Wis. : Crop Science Society of America. *Crop science*. Jan/Feb 1990. v. 30 (1). p. 242-243. Includes references. (NAL Call No.: DNAL 64.8 C883).

0330

**Registration of SD43 parental line of maize.**

CRPSAY. Wicks, Z.W. III. Carson, M.L.; Scholten, G.G. Madison, Wis. : Crop Science Society of America. *Crop science*. Nov/Dec 1988. v. 28 (6). p. 1041. Includes references. (NAL Call No.: DNAL 64.8 C883).

0331

**Registration of three parental lines of maize with improved resistance to gray leaf spot.**

CRPSAY. Johnson, M.W. Ayers, J.E. Madison, Wis. : Crop Science Society of America. *Crop science*. Sept/Oct 1988. v. 28 (5). p. 876-877. Includes references. (NAL Call No.: DNAL 64.8 C883).

0332

**Registration of three yellow dent maize lines R225, R226, and R227.**

CRPSAY. Lambert, R.J. Madison, Wis. : Crop Science Society of America. *Crop science*. Nov/Dec 1989. v. 29 (6). p. 1586-1587. Includes references. (NAL Call No.: DNAL 64.8 C883).

0333

**Relation of corn leaf aphid (Homoptera: Aphididae) colonization to DIMBOA content in maize inbred lines.**

JEENAI. Bing, J.W. Guthrie, W.D.; Dicke, F.F.; Obrychi, J.J. Lanham, Md. : Entomological Society of America. Five inbred maize (*Zea mays* L.) lines (B37, B73, C103, Mo17, and 41:2504B) were evaluated from emergence to the eight-leaf stage for corn leaf aphid (*Rhopalosiphum maidis* (Fitch)) colonization. Concentration of 2,4-dihydroxy-7-methoxyl-1,4-benzoxazin-3-one (DIMBOA) in these inbred lines was analyzed from emergence to anthesis to determine its effect on corn leaf aphid colony development. Inbred line 41:2504B, which was colonized by corn leaf aphids as it emerged from the soil, had the highest DIMBOA concentration. Inbred lines B73 and B37 were low in DIMBOA and were colonized in the three- and six-leaf stages, respectively. Inbred lines C103 and Mo17 also were low in DIMBOA and supported small colonies after the six- and seven-leaf stages, respectively. Contrary to findings of previous studies, DIMBOA does not seem to be the primary factor conditioning resistance to the corn leaf aphid in these inbreds. *Journal of economic entomology*. Aug 1990. v. 83 (4). p. 1626-1632. Includes references. (NAL Call No.: DNAL 421 J822).

## (PLANT BREEDING)

0334

### Relationship between leaf freckles and wilt severity and yield losses in closely related maize hybrids.

PHYTA. Carson, M.L. Wicks, Z.W. III. St. Paul, Minn. : American Phytopathological Society. The relationship between severity of leaf freckles and wilt, caused by *Clavibacter michiganense* subsp. *nebrascense*, and the percentage of grain yield loss was examined in a set of 42 closely related maize hybrids. Forty-two sister inbred lines, derived from a modified backcrossing program that used the inbred A632 as the recurrent parent, were crossed to A619. The resulting hybrids were evaluated over 2 yr in a split-plot field experiment with hybrids as whole plots and inoculated vs. uninoculated treatments as split plots. The hybrids varied widely in reaction to leaf freckles and wilt and in yield loss sustained from the disease. The percentages of yield loss were significantly correlated with disease severities in both years and in the combined analysis. Several hybrids had high disease severity but sustained insignificant yield loss compared with susceptible hybrids, indicating possible leaf freckles and wilt tolerance. However, when a more rigorous test of tolerance that used studentized residuals from the loss-severity regression was applied to the data, tolerance appeared to be an unstable character. Resistance to leaf freckles and wilt was not related to poor grain yield in the absence of disease. *Phytopathology*. Jan 1991. v. 81 (1). p. 95-98. Includes references. (NAL Call No.: DNAL 464.8 P56).

0335

### Relationships between laboratory germination tests and field emergence of maize inbreds.

CRPSAY. Martin, B.A. Smith, O.S.; O'Neil, M. Madison, Wis. : Crop Science Society of America. In the USA and Europe maize (*Zea mays* L.) is often planted into soils that are or become cold and wet resulting in reduced field emergence, poor stands, and lower economic yields. This study was conducted to determine the relative merits of two germination tests, the cold and soak tests, for prediction of field emergence when soil temperatures are suboptimal for germination. The effects of initial seed moisture on field emergence were also investigated. Field emergence of 48 maize inbred lines was measured in eight locations in 1986 and 1987. The seeds of each inbred were also cold and soak tested. Seeds taken directly from conditioned storage and seeds dried to 80 g kg<sup>-1</sup> moisture were used in these studies. In 1986, the cold and soak test were equally correlated with field emergence ( $r = 0.43$ ) (significant at the 0.01 level of probability) and 0.40 respectively. In 1987, the cold test was more highly correlated with field emergence ( $r = 0.74$ ) than the soak test ( $r = 0.43$ ). These correlations between laboratory germination tests and field emergence were affected by both location and year. Drying seeds to 80 g kg<sup>-1</sup> moisture resulted in an overall 5% decrease in field emergence in both years. There was a significant inbred

line-by-year interaction, but only one inbred was significantly affected in both years. The value of these germination tests as a tool to aid selection was also investigated and both tests were equally accurate (60% agreement) at predicting those inbreds with field emergence in the lower 30% in both years. The soak test may be considered a rapid, inexpensive, and effective selection tool for elimination of those inbreds with poor field emergence, however, the cold test was superior for prediction of the field emergence of a wide range of inbred lines in a number of environments. *Crop science*. Sept/Oct 1988. v. 28 (5). p. 801-805. Includes references. (NAL Call No.: DNAL 64.8 C883).

0336

### Relationships between yield of three maize hybrids and severity of southern leaf blight caused by race 0 of *Bipolaris maydis*.

PLDIDE. Byrnes, K.J. Pataky, J.K.; White, D.G. St. Paul, Minn. : American Phytopathological Society. *Plant disease*. Oct 1989. v. 73 (10). p. 834-840. Includes references. (NAL Call No.: DNAL 1.9 P69P).

0337

### Reproduction of *Meloidogyne javanica* on corn hybrids and inbreds.

Windham, G.L. Williams, W.P. Washington, D.C. : The Service. Reprints - U.S. Department of Agriculture, Agricultural Research Service. 1988. (3). p. 25-28. Includes references. (NAL Call No.: DNAL aS21.A8U5/ARS).

0338

### Research advances on European corn borer resistance.

SWORAX. Ferriss, R. Des Plains, Ill. : Scranton Gillette Communications, Inc. *Seed world*. Dec 1988. v. 126 (13). p. 36-37. (NAL Call No.: DNAL 61.8 SE52).

0339

### Resistance in susceptible maize to *Helminthosporium carbonum* race 1 induced by prior inoculation with race 2.

PHYTA. Cantone, F.A. Dunkle, L.D. St. Paul, Minn. : American Phytopathological Society. Inoculation of leaves of susceptible maize genotypes with the nonpathogenic race 2 of *Helminthosporium carbonum* at least 10 hr before inoculation with the pathogenic race 1 prevented development of large lesions typical of the susceptible reaction. Appressorium formation, penetration, and hyphal growth by the pathogen were decreased. Addition of HC-toxin (the host-specific toxin produced by pathogenic race 1) to the race 1 challenge inoculum abolished the resistance induced by race 2. Inoculation with *H. victoriae*, *H.*

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turcicum, or Alternaria sp. at least 18 hr before inoculation with H. carbonum race 1 also induced resistance. The results suggest that a general resistance mechanism is activated upon contact of the maize leaf with a potential pathogen and that HC-toxin plays a role in pathogenesis by preventing or overcoming those events. *Phytopathology*. Nov 1990. v. 80 (11). p. 1221-1224. illl. Includes references. (NAL Call No.: DNAL 464.8 P56).

0340

### Resistance of corn to southern root-knot nematode.

CRPSAY. Williams, W.P. Windham, G.L. Madison, Wis. : Crop Science Society of America. *Crop science*. May/June 1988. v. 28 (3). p. 495-496. Includes references. (NAL Call No.: DNAL 64.8 C883).

0341

### Resistance of maize hybrids to Meloidogyne javanica.

NMTPA. Poerba, Y.S. Windham, G.L.; Williams, W.P. Auburn, Ala. : Organization of Tropical American Nematologists. *Nemtropica*. Dec 1990. v. 20 (2). p. 169-172. Includes references. (NAL Call No.: DNAL SB998.N4N4).

0342

### Resistance to first-generation European corn borer (Lepidoptera: Pyralidae) and DIMBOA concentration in midwhorl leaves of the BS9 maize synthetic.

JKESA. Grumbacher, A.W. Russell, W.A.; Guthrie, W.D. Lawrence, Kan. : The Society Journal of the Kansas Entomological Society. Jan 1989. v. 62 (1). p. 103-107. Includes references. (NAL Call No.: DNAL 420 K13).

0343

### Response of two maize synthetics to recurrent selection for resistance to first-generation European corn borer (Lepidoptera: Pyralidae) and Diplodia stalk rot.

JEENAI. Nyhus, K.A. Russell, W.A.; Guthrie, W.D. Lanham, Md. : Entomological Society of America. *Journal of economic entomology*. Includes statistical data. Dec 1988. v. 81 (6). p. 1792-1798. Includes references. (NAL Call No.: DNAL 421 J822).

0344

### Rotational cropping sequence affects yield of corn and soybean.

AGUOAT. Crookston, R.K. Kurle, J.E.; Copeland, P.J.; Ford, J.H.; Lueschen, W.E. Madison, Wis. : American Society of Agronomy. There are numerous reports of the beneficial effects of

rotating corn (*Zea mays* L.) and soybean (*Glycine max* (L.) Merr.). However, few studies have been specifically designed to document the important corn-soybean rotation effect. The objective of this study was to determine the impact of various corn and soybean cropping patterns on the yield of both crops. The 9-year field study conducted at two locations was managed for maximum production. Cropping sequences consisted of: continuous monoculture with the same cultivar; continuous monoculture with cultivars alternated; annual rotation of the two crops; and 1, 2, 3, 4, and 5 yr of monoculture following 5 yr of the other crop. Annually rotated corn yielded 10% better, and first-year corn yielded 15% better than corn under monoculture. Annually rotated soybean yielded 8% better, and first year soybean yielded 17% better than soybean under monoculture. With monoculture of either crop, alternating two different cultivars annually resulted in the same yield as continuous cropping of just one cultivar. There were differences in the response of the two crops to increasing years of monoculture: the lowest corn yield was from second year corn; the lowest soybean yield was from extended monoculture. Total corn dry weight was affected by cropping sequence but soybean dry weight was not. Our data suggest that, from a yield standpoint a superior cropping sequence for Minnesota would include at least three, and possibly more crops. *Agronomy journal*. Jan/Feb 1991. v. 83 (1). p. 108-113. Includes references. (NAL Call No.: DNAL 4 AM34P).

0345

### Seedling stage feeding by corn leaf aphid (Homoptera: Aphididae): influence on plant development in maize.

JEENAI. Bing, J.W. Guthrie, W.D.; Dicke, F.F.; Obrycki, J.J. Lanham, Md. : Entomological Society of America. Five maize (*Zea mays* L.) inbred lines (B37, B73, C103, Mo17, and B96 41:2504B) were infested with alate corn leaf aphids, *Rhopalosiphum maidis* (Fitch), in the greenhouse, and then transplanted to the field to quantify the effects of seedling feeding. Feeding by corn leaf aphids on coleoptile and two-leaf stage plants delayed plant development; plant height was reduced, and pollen shed and silking were delayed. Grain fill was also lower for plants infested in the coleoptile, two-leaf, and four-leaf stages compared with uninfested plants. Aphid feeding reduced grain-fill ratings in inbreds B37, C103, and B96, but did not reduce grain fill in B73 and Mo17. Alate corn leaf aphid feeding on seedling maize can affect plant development and grain fill later in the season. *Journal of economic entomology*. Apr 1991. v. 84 (2). p. 625-632. Includes references. (NAL Call No.: DNAL 421 J822).

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0346

**Selection and characterization of sethoxydim-tolerant maize tissue cultures.**  
PLPHA. Parker, W.B. Somers, D.A.; Wyse, D.L.; Keith, R.A.; Burton, J.D.; Gronwald, J.W.; Gengenbach, B.G. Rockville, Md. : American Society of Plant Physiologists. 'Black Mexican Sweet' (BMS) maize (*Zea mays L.*) tissue cultures were selected for tolerance to sethoxydim. Sethoxydim, a cyclohexanedione, and haloxyfop, an aryloxyphenoxypropionate, exert herbicidal activity on most monocots including maize by inhibiting acetyl-coenzyme A carboxylase (ACCase). Selected line B10S grew on medium containing 10 micromolar sethoxydim. Lines B50S and B100S were subsequent selections from B10S that grew on medium containing 50 and 100 micromolar sethoxydim, respectively. Growth rates of BMS, B10S, B50S, and B100S were similar in the absence of herbicide. Herbicide concentrations reducing growth by 50% were 0.6, 4.5, 35, and 26 micromolar sethoxydim and 0.06, 0.5, 5.4, and 1.8 micromolar haloxyfop for BMS, B10S, B50S, and B100S, respectively. Sethoxydim and haloxyfop concentrations that inhibited ACCase by 50% were similar for BMS, B10S, B50S, and B100S. However, ACCase activities were 6.1, 10.7, 16.1, and 11.4 nmol HC03- incorporated per milligram of protein per minute in extracts of BMS, B10S, B50S, and B100S, respectively, suggesting that increased wild-type ACCase activity conferred herbicide tolerance. Incorporation of <sup>14</sup>C acetate into the nonpolar lipid fraction was higher for B50S than for BMS in the absence of sethoxydim providing further evidence for an increase in ACCase activity in the selected line. In the presence of 5 micromolar sethoxydim, <sup>14</sup>C acetate incorporation by B50S was similar to that for untreated BMS. The levels of a biotin-containing polypeptide (about 220,000 molecular weight), presumably the ACCase subunit, were increased in the tissue cultures that exhibited elevated ACCase activity indicating overproduction of the ACCase enzyme. Plant physiology. Apr 1990. v. 92 (4). p. 1220-1225. 111. Includes references. (NAL Call No.: DNAL 450 P692).

0347

**Stadia, larval-pupal weight, and width of head capsules of corn earworm (*Lepidoptera: Noctuidae*) after feeding on varying resistance levels of maize silks.**  
JESCEP. Wiseman, B.R. Isenhour, D.J.; Bhagwat, V.R. Tifton, Ga. : Georgia Entomological Society. Journal of entomological science. July 1991. v. 26 (3). p. 303-309. Includes references. (NAL Call No.: DNAL QL461.G4).

0348

**Stalk quality and stalk rot resistance of tropical hybrid maize derivatives.**  
PLDIDE. Holley, R.N. Goodman, M.M. St. Paul, Minn. : American Phytopathological Society. Plant disease. Apr 1988. v. 72 (4). p. 321-324. Includes references. (NAL Call No.: DNAL 1.9

P69P).

0349

**The Texas cytoplasm of maize: cytoplasmic male sterility and disease susceptibility.**  
SCIEA. Levings, C.S. III. Washington, D.C. : American Association for the Advancement of Science. The Texas cytoplasm of maize carries two cytoplasmically inherited traits, male sterility and disease susceptibility, which have been of great interest both for basic research and plant breeding. The two traits are inseparable and are associated with an unusual mitochondrial gene, T-urf13, which encodes a 13-kilodalton polypeptide (URF13). An interaction between fungal toxins and URF13, which results in permeabilization of the inner mitochondrial membrane, accounts for the specific susceptibility to the fungal pathogens. Science. Nov 16, 1990. v. 250 (4983). p. 942-947. Includes references. (NAL Call No.: DNAL 470 SCI2).

0350

**Tolerance of corn (*Zea mays*) lines to clomazone.**

WEESA6. Keifer, D.W. Champaign, Ill. : Weed Science Society of America. Corn hybrids and inbreds were ranked for their relative tolerance to soil-incorporated clomazone, as assessed by the level of discoloration injury in the greenhouse. Inbred W117 was the most tolerant corn line tested. Some corn lines were affected similarly by clomazone. Inbred A619 was in the most susceptible group. Clomazone injury to A619 (susceptible) and W117 (tolerant) corn was similar when the clomazone rate was 10-fold greater on W117 than on A619. The distribution of corn lines on a sensitivity scale was of limited range; the distribution of hybrids on this scale was a single symmetrical peak. Changing the growth temperature or soil composition would change the absolute level of corn injury caused by a rate of clomazone but did not change the relative ranking of the corn lines in the test. A subset of the greenhouse-tested corn lines also was evaluated in several field locations. The tolerance of corn in a given field was highly (*P* less than 0.005) correlated with tolerance in the greenhouse; however, the absolute levels of injury differed among locations. The tolerance of hybrids of known pedigree was highly (*P* less than 0.0002) correlated with the tolerance of the parent inbreds, indicating this trait was inherited. Weed science. July 1989. v. 37 (4). p. 622-628. Includes references. (NAL Call No.: DNAL 79.8 W41).

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0351

**Ultrastructural morphology of *Uromyces transversalis* in infection of resistant and susceptible gladiolus hosts and a nonhost, *Zea mays*.**

PHYTA. Ferreira, J.F. Rijkenberg, F.H.J. St. Paul, Minn. : American Phytopathological Society. The infection structures of gladiolus rust, *Uromyces transversalis*, on and in host leaves of the susceptible gladiolus cultivar (Goldfield) and resistant species (*Gladiolus dalenii*) and in leaves of the nonhost (*Zea mays*) were examined by scanning and transmission electron microscopy. The number of germinated urediospores that formed appressoria on the resistant host was significantly fewer than the number formed on the susceptible host. The major determinant of resistance in the host was manifested in the significant proportion of substomatal vesicles with primary hyphae that aborted before the formation of haustorial mother cells and/or secondary hyphae. This was correlated with a similar reaction in the nonhost. The abortion was attributed to the putatively incomplete adhesion of haustorial mother cells to mesophyll cells. In the nonhost, although no secondary hyphae were formed, some haustorial mother cells were formed, and a significant proportion of primary hyphae did not form haustorial mother cells and/or secondary hyphae. *Phytopathology*. June 1991. v. 81 (6). p. 596-602. Includes references. (NAL Call No.: DNAL 464.8 P56).

0352

**Use of winter wheat (*Triticum aestivum*) cultivars and herbicides in aiding weed control in an ecofallow corn (*Zea mays*) rotation.**

WEESA6. Ramsel, R.E. Wicks, G.A. Champaign, Ill. : Weed Science Society of America.

Abstract: An experiment involving six winter wheat (*Triticum aestivum* L.) cultivars, an early-April herbicide application on wheat and on four dates after wheat harvest, and the growth of a subsequently planted corn (*Zea mays* L.) crop was conducted at North Platte, NE. 'Centurk 78' suppressed barnyardgrass

*Echinochloa crus-galli* (L.) Beauv. ~ ECHCG more than 'Bennett' and 'Eagle' in the growing wheat and after wheat harvest in July, but there were no differences in weed yield among cultivars in corn planted 11 months later. Herbicides applied to the tillering wheat in early April improved weed control in wheat and the subsequent corn crop. Also, herbicides were applied 5, 25, 45, and 300 days after wheat harvest. Weed growth increased and soil water decreased as spraying dates were delayed. Herbicides applied 5 days after harvest did not maintain adequate weed control in the corn planted 11 months after wheat harvest and low corn yield resulted. Plots receiving herbicides 300 days after wheat harvest had the least soil water in the fall after wheat harvest but the best weed control in corn and highest corn yields because of better weed control in corn. *Weed science*. May 1988. v. 36 (3). p. 394-398. Includes references. (NAL Call No.: DNAL 79.8 W41).

0353

**Using upper-bound slope through origin to estimate genetic harvest index.**

AGJOAT. Prihar, S.S. Stewart, B.A. Madison, Wis. : American Society of Agronomy. Harvest index (HI), the ratio of grain to aboveground dry matter, is reported to be a species-related parameter and is recommended for screening cultivars. But the fact that it is affected by environmental stress limits its use for intercrop or intercultivar comparisons. Fair comparisons should be based on estimated genetic HI for a given environment, but a procedure to determine the same is lacking. We propose that the slope of an upper-bound in the grain yield vs. dry matter plot passing through the origin approximates the genetic HI because the highest grain yields against given dry matter represent the least-stressed and/or stress-adapted plants and passage of the line through the origin is necessary to satisfy the definition of HI. This HI also provides a useful reference for interpreting agronomic data with respect to stress effects associated with management practices. The HIs of sorghum *Sorghum bicolor* (L.) Moench, corn (*Zea mays* L.), and wheat (*Triticum aestivum* L.) were estimated by the upper-bounds of grain yield (corrected to dry weight) vs. dry matter yield taken from existing reports in the literature. Harvest index of sorghum and irrigated corn ranged between narrow limits of 0.48 to 0.53 and 0.58 to 0.60, respectively. Harvest index of irrigated wheat ranged from 0.38 to 0.47. Stress effects on HI are illustrated in plots of published and unpublished (dry) grain yields vs. dry matter yields and reasons for the same are discussed. *Agronomy journal*. Nov/Dec 1990. v. 82 (6). p. 1160-1165. Includes references. (NAL Call No.: DNAL 4 AM34P).

0354

**Variation in expression of monogenic resistance in corn to *Exserohilum turcicum* race 3 under different temperature and light regimes.**

PHYTA. Leath, S. Thakur, R.P.; Leonard, K.J. St. Paul, Minn. : American Phytopathological Society. Expression of monogenic resistance in near-isogenic corn inbred lines H4460Ht1, H4460Ht2, and H4460Ht3 against isolates of races 1 and 3 of *Exserohilum turcicum* was determined under different temperature and light intensity regimes. These environmental conditions influenced lesion type, number, length, and sporulation of the fungus. In general, isolates of *E. turcicum* produced more lesions at 22/18 than at 26/22 C and more lesions at 162 or 324 than at 647 micromol m<sup>-2</sup> s<sup>-1</sup> at 22/18 C. Lesions also were larger (P = 0.05) at the reduced light intensities. Virulence of three races of *E. turcicum* was clearly expressed and consistent with earlier reports at 22/18 C day/night temperature and low light intensity (324 or 162 micromol m<sup>-2</sup> s<sup>-1</sup>), but inconsistencies arose at 26/22 C day/night temperature and 647 micromol m<sup>-2</sup> s<sup>-1</sup> light intensity. Resistance of Ht1, Ht2, and Ht3 often was incomplete at 22/18 C day/night temperature and low light intensity. Race 3 could be readily recognized at a 22/18 C

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day/night temperature regime with the differential reaction clearest at a light intensity of 324 micromol m<sup>-2</sup> s<sup>-1</sup>. *Phytopathology*. Mar 1990. v. 80 (3). p. 309-313. ill. Includes references. (NAL Call No.: DNAL 464.8 P56).

0355

### Weed management to minimize black cutworm (*Lepidoptera: Noctuidae*) damage in no-till corn.

JEENAI. Engelken, L.K. Showers, W.B.; Taylor, S.E. Lanham, Md. : Entomological Society of America. Field studies were conducted in 1984 and 1985 to evaluate the interaction between black cutworm, *Agrotis ipsilon* (Hufnagel), damage and weed competition on no-till corn (*Zea mays* L.) growth and yields. Corn seedling damage by *A. ipsilon* introduced as third instars 5 d before planting was most severe when weeds were removed at the coleoptile stage and larvae were predicted to be fifth to sixth instars. Delaying weed removal until plants had attained the two-leaf stage significantly decreased the percentage of corn plants damaged by *A. ipsilon* larvae. *A. ipsilon* larvae introduced as second instars or a combination of neonate, second, and third instars 5 d before planting damaged more corn plants when weed removal was performed at two-leaf stage corn and larvae were predicted to be fifth to sixth instars. A significant relationship between the number of corn seedlings cut and weed population occurred for these introduced smaller instars when weed removal occurred at two-leaf stage corn. Delaying weed removal until four-leaf stage corn resulted in significant grain yield reductions from both weed competition and *A. ipsilon* damage in 1984 and only from weed competition in 1985. *Journal of economic entomology*. June 1990. v. 83 (3). p. 1058-1063. Includes references. (NAL Call No.: DNAL 421 J822).

0356

### Yellow- and white-endosperm effects on Stewart's wilt of maize.

PHYTAJ. Kang, M.S. Zuber, M.S. St. Paul, Minn. : American Phytopathological Society. *Phytopathology*. July 1988. v. 78 (7). p. 909-911. Includes references. (NAL Call No.: DNAL 464.8 P56).

0357

### Yield and quality of forage maize as influenced by hybrid, planting date, and plant density.

AGJOAT. Graybill, J.S. Cox, W.J.; Otis, D.J. Madison, Wis. : American Society of Agronomy. Although forage maize (*Zea mays* L.) is grown extensively on livestock operations, most management studies in the USA focus on grain production. Field studies were conducted in New York to evaluate dry matter (DM) yield and forage quality responses of commercial hybrids to planting dates and densities. Six hybrids

were planted on 25 April, 9 May, and 23 May and thinned to 5.0, 6.5, and 8.0 plants m<sup>-2</sup> in 1988 and 1989. A significant year X planting date interaction was observed for DM yield because dry early-season conditions in 1988 negated the advantage of early planting in northern latitudes (13.4, 13.9, and 14.6 Mg ha<sup>-1</sup> for planting dates 25 April, 9 May, and 23 May, respectively). When averaged across years, high plant densities increased DM yields (15.7, 16.5, and 17.5 Mg ha<sup>-1</sup> at 5.0, 6.5, and 8.0 plants m<sup>-2</sup> respectively) with no significant effect on harvest index (524, 523, and 526 g kg<sup>-1</sup> at 5.0, 6.5, and 8.0 plants m<sup>-2</sup>, respectively). A hybrid X density interaction was observed for DM yield that suggests that some hybrids in this study performed better at higher densities. Plant density had little effect on acid detergent fiber (ADF) and neutral detergent fiber (NDF) concentrations indicating that forage quality can be maintained at high densities. Hybrids showed distinct variation for ADF (186-217 g kg<sup>-1</sup>), NDF (414-434 g kg<sup>-1</sup>), and crude protein (CP) (72-77 g kg<sup>-1</sup>) concentrations. The forage quality differences among hybrids may be of sufficient magnitude to be of value to the forage producer. *Agronomy journal*. May/June 1991. v. 83 (3). p. 559-564. Includes references. (NAL Call No.: DNAL 4 AM34P).

0358

### Yield characteristics of ancient races of maize compared to a modern hybrid.

AGJOAT. Gardner, F.P. Valle, R.; McCloud, D.E. Madison, Wis. : American Society of Agronomy. Open-pollinated races of maize (*Zea mays* L.) have been cultivated in the Americas since antiquity although their performance is poor compared to modern hybrids. However, morphological-physiological characteristics that contribute to the yield superiority of modern hybrids over ancient lines have not been well documented and such information should be useful in the selection of improved open-pollinated lines and management strategies. Therefore, a study was conducted in Gainesville, FL (29 degrees 38'N lat) to identify and quantify morphological-physiological traits that are responsible for yield differences between ancient and modern hybrid maize cultivars. The characteristics assessed included photosynthetic capacity, grain-filling rate and duration, and photosynthate partitioning. Three Central American ancient lines (Chapalote, Nal-Tel, and Maiz Criollo) and a hybrid (Coker 77) widely adapted to the Southeast USA, were sequentially harvested at 10-d intervals until physiological maturity for growth analysis. Leaf area index (LAI) and vegetative crop growth rate (CGRv) were similar for all genotypes except for Nal-Tel, which had lower values. The hybrid had greater LAI, leaf area duration (LAD), ear and kernel growth rates, as well as kernel number and size. Additionally, the hybrid redistributed more stalk-stored photosynthate to the grain, and its grain-filling period was longer. We conclude that the primary weaknesses of these ancient races compared to hybrids were low LAI and LAD,

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short grain-filling duration, and low photosynthate redistribution and sink capacity due to fewer and smaller kernels. *Agronomy journal*. Sept/Oct 1990. v. 82 (5). p. 864-868. Includes references. (NAL Call No.: DNAL 4 AM34P).

0362

**2001 Agriculture: High tech hits the dirt.** 1. Kozlov, A. Los Angeles, Calif. : Time, Inc. *Discover*. Nov 1988. v. 9 (11). p. 58-59. (NAL Call No.: DNAL Q1.D57).

0359

**Yield response of corn stands to stalk borer (Lepidoptera: Noctuidae) injury imposed during early development.**

JEEAI. Davis, P.M. Pedigo, L.P. Lanham, Md. : Entomological Society of America. In a 3-yr study, visual injury and grain yield were evaluated for two full-season corn (*Zea mays* L.) hybrids infested by stalk borer larvae, *Papaipema nebris* (Guenee), at leaf stages 1 through 7. Individual plants were assigned a rating based upon a six-class scale, and the average rating per plot was determined; 80% of the total number of injured plants within each plot were classified as injured within 1 wk after infestation. A significant linear relationship between leaf stage and injury rating was detected in all years of the study, with injury rating declining at an average rate of  $0.332 \pm 0.033$  points per leaf stage. In all years, infested plots yielded significantly less grain than uninfested control plots. Average yields of Pioneer hybrids 3541 and 3377 were reduced by 24.8 and 18.9%, respectively, when compared with uninfested control plots. In 2 of 3 yr, yield losses declined linearly as plants were attacked later in development. However, in a drought-stressed year, leaf stage was independent of plot yield even though injury ratings for each leaf stage were very similar to those recorded during years with normal rainfall. Linear models, which regressed injury rating on yield, were developed and compared for each year and hybrid combination. *Journal of economic entomology*. Aug 1990. v. 83 (4). p. 1582-1586. Includes references. (NAL Call No.: DNAL 421 J822).

0360

**1989 corn performance tests.**

GARRA. Day, J.L. Raymer, P.L.; Gipson, R.D. Athens, Ga. : The Stations. Research report - University of Georgia, College of Agriculture, Agricultural Experiment Stations. Nov 1989. (585). p. 1-25. (NAL Call No.: DNAL S51.E22).

0361

**1991 corn performance tests.**

GARRA. Gibson, R.E. (ed.). Raymer, P.L. (ed.); Day, J.L. (ed.). Athens, Ga. : The Stations. Research report - University of Georgia, College of Agriculture, Agricultural Experiment Stations. Dec 1991. (606). 37 p. (NAL Call No.: DNAL S51.E22).

# PLANT ECOLOGY

0363

Intra- and interclonal competition in the cleistogamous grass *Amphibromus scabridalis*. AJBOAA. Cheplick, G.P. Salvador, G.M. Columbus, Ohio : Botanical Society of America. The relationship of differences in life history traits among genotypes to competitive ability is not well known for most clonal plants. It has been hypothesized that genetically identical clones will compete more intensively than genetically distinct clones. The perennial grass *Amphibromus scabridalis*, which produces basal corns and cleistogamous seeds enclosed by leaf sheaths, exhibits pronounced clonal growth via rhizome and ramet production. In a controlled greenhouse experiment, clones of four genotypes of this species were grown under three regimes: alone in the absence of competition, paired with a clone of the same genotype (intraclonal competition), and paired with a clone of a different genotype (interclonal competition). There were differences in some biomass measures and in ramet and corn production among the four genotypes grown in the absence of competition. All genotypes showed a significant reduction in total biomass under both intra- and interclonal conditions, indicating that competition had occurred. For three of four genotypes, biomass allocation to corn increased under competition, while allocation to cleistogamous seeds was constant or increased slightly. Although some genotypes in specific interclonal combinations were less affected by competition than in intraclonal combinations, there was no support for the contention that the effects of competition were more intense for genetically identical clones. American journal of botany. Nov 1991. v. 78 (11). p. 1494-1502. Includes references. (NAL Call No.: DNAL 450 AM36).

current fertilizer and pesticide application methods. Agronomy journal. Nov/Dec 1990. v. 82 (6). p. 1166-1169. Includes references. (NAL Call No.: DNAL 4 AM34P).

0365

Wild proso millet (*Panicum miliaceum*) interference in corn (*Zea mays*). WEESA6. Wilson, R.G. Westra, P. Champaign, Ill. : Weed Science Society of America. Effects of wild proso millet interference with irrigated corn were evaluated in Nebraska and Colorado over a 2-yr period. Corn yield reductions ranged from 13 to 22% from a wild proso millet density of 10 plants m<sup>-2</sup>. As density increased, corn yield reduction could be predicted with a rectangular hyperbola regression model. Ten wild proso millet plants m<sup>-2</sup> growing with corn produced 4200 to 6200 seed m<sup>-2</sup>. Corn yields were reduced 10% at one location if wild proso millet removal was delayed 2 weeks after corn planting. If removal was further delayed until 6 weeks after corn planting, corn yield reductions at the two locations ranged from 16 to 28%. Weed science. Apr/June 1991. v. 39 (2). p. 217-220. Includes references. (NAL Call No.: DNAL 79.8 W41).

0364

Rainfall distribution under a corn canopy: implications for managing agrochemicals. AGJOAT. Parkin, T.B. Codling, E.E. Madison, Wis. : American Society of Agronomy. A greater understanding of the spatial patterns of water inputs to soil will aid the development of agricultural practices to reduce leaching and runoff of agrochemicals. This study was initiated to investigate the process of stemflow, and to provide quantitative data on the distribution of rainfall under a corn (*Zea mays L.*) canopy. Rainfall distribution under the canopies of replicate conventional till corn plots was investigated by placing rainfall collectors at discrete locations within small 1.6-m by 0.76-m areas of the plots. Collection cups were also fixed around the stalks of individual corn plants to quantify stemflow. Results obtained from eight storm events in 1987 revealed that corn plants channel 19 to 49% of the total rain inputs down the stem to the base of the stalk. This stemflow plus the rainfall impinging directly in the planting furrow, accounted for approximately 42% of the total water inputs from a given storm event. These increased water inputs to the planting furrow may have implications in modeling solute leaching and runoff as well as to modifying

# PLANT STRUCTURE

0366

## Conidial dimorphism in *Colletotrichum graminicola*.

MYCOAE. Panaccione, D.G. Vaillancourt, L.J.; Hanau, R.M. Bronx, N.Y. : The New York Botanical Garden. Mycologia. Nov/Dec 1989. v. 81 (6). p. 876-883. illl. Includes references. (NAL Call No.: DNAL 450 M99).

0367

## Effects of napropamide on growth and anatomy of corn, *Zea mays*, roots.

WEESA6. Di Tomaso, J.M. Ashton, F.M.; Rost, T.L. Champaign, Ill. : Weed Science Society of America. Structural studies were conducted to evaluate the effects of napropamide on growth and development of corn roots. At 1.0 and 10.0 micrometer napropamide, root growth was inhibited severely within 3 days of seed germination. Root diameter within 1 mm of the root apex doubled and numerous lateral root primordia were observed within 10 mm of the meristem tip in treated roots. The number of cortical parenchyma cell files, xylem vessel, and phloem sieve tube strands also significantly increased. Average cortical cell size did not change, regardless of the treatment. A lateral expansion of the meristematic region of the root coincided with a slight reduction in meristem length but resulted in an overall increase in meristem volume. However, enlargement of the meristem occurred despite a reduction in the number of mitotic figures in the root meristem. Treatment of excised root tips for 24 h with 20 micrometer napropamide reduced the number of mitotic figures 84%. Nomenclature: Napropamide, N,N-diethyl-2-(1-naphthalenloxy) propionamide; corn, *Zea mays* L. 'Iochief'. Weed science. July 1988. v. 36 (4). p. 457-463. illl. Includes references. (NAL Call No.: DNAL 79.8 W41).

0368

## Morphological responses of crop and weed species of different growth forms to ultraviolet-B radiation.

AJBOAA. Barnes, P.W. Flint, S.D.; Caldwell, M.M. Columbus, Ohio : Botanical Society of America. American journal of botany. Oct 1990. v. 77 (10). p. 1354-1360. Includes references. (NAL Call No.: DNAL 450 AM36).

0369

## Pathogenesis in *Aspergillus* ear rot of maize: light microscopy of fungal spread from wounds.

PHYTA. Smart, M.G. Wicklow, D.T.; Caldwell, R.W. St. Paul, Minn. : American Phytopathological Society. We describe the histology of fungal development in maize ears wound inoculated with *Aspergillus flavus*. Plants were inoculated 21 days after style emergence; wounded grains and adjacent spikelets (with their rachis segments) were harvested at intervals up to 28 days later.

Tissues were processed for plastic embedding and 1.5-micrometer thick sections were examined by bright field microscopy. The fungus spread from the wound sometime after 14 days postinoculation, and at 28 days postinoculation it could be found in small amounts throughout all rachis tissues except the pith and lignified fibers. The fungus entered the rachillae of adjacent spikelets from the rachis and also from the bracts at their insertion point. The fungus grew through the aerenchyma in the rachilla to the floral axis and innermost layers of the pericarp (the endocarp). Hyphae did not penetrate to the endocarp from the exterior of the pericarp. The hyphae were always intercellular in the rachis, rachilla, and pericarp. They were both inter- and intracellular in the floral axis and internal to the testa (i.e., inside the seed proper). From the endocarp, entry into the seed was not across the black layer; random tears in the testa over the embryo were the probable immediate pathway. Hyphae were vacuolate everywhere except in the seed. Host cells died (and even collapsed) ahead of the fungus, but no other structural alterations were seen. Phytopathology. Dec 1990. v. 80 (12). p. 1287-1294. illl. Includes references. (NAL Call No.: DNAL 464.8 P56).

0370

## Relationships among ear morphology, western flower thrips, and *Fusarium* ear rot of corn.

PHYTA. Farrar, J.J. Davis, R.M. St. Paul, Minn. : American Phytopathological Society. The relationships among insects, corn (*Zea mays*) ear morphology, and ear rot caused by *Fusarium moniliforme* were studied in 1988 and 1989. Silks on ears of two corn hybrids, one susceptible to *Fusarium* ear rot and one with an intermediate level of resistance, received applications of the insecticides acephate or carbaryl at the green silk stage before the onset of ear rot symptoms. In both years, insecticide treatments reduced intra-ear populations of western flower thrips (*Frankliniella occidentalis*) at the brown silk stage and reduced disease incidence at maturity. In 1989, 15 corn hybrids, representing a range of susceptibility to *Fusarium* ear rot, were examined for ear morphology factors that may be correlated with disease incidence. Factors examined were heat units to silking; days from initial green silk to yellow-brown silk and to brown silk stages; intra-ear thrips populations at the green, yellow-brown, and brown silk stages; and husk looseness at the yellow-brown and brown silk stages. Disease incidence was correlated with thrips populations at the brown silk stage and with husk looseness at the brown silk stage but was not correlated with the other factors measured. Hybrids also could be separated by contrast analysis into susceptible, intermediate, and resistant groups on the basis of thrips populations and husk looseness at the brown silk stage. On the basis of these data, intra-ear thrips populations and husk tightness at the brown silk stage are important in the epidemiology of *Fusarium* ear rot. Phytopathology. June 1991. v. 81 (6). p.

## (PLANT STRUCTURE)

661-666. Includes references. (NAL Call No.: DNAL 464.8 P56).

0371

### Tubular helical structures and fine filaments associated with the leafhopper-borne maize yellow stripe virus.

PHYTA. Ammar, E.D. Gingery, R.E.; Gordon, D.T.; Aboul-Ata, A.E. St. Paul, Minn. : American Phytopathological Society. A new disease agent, designated maize yellow stripe virus (MYSV) and transmitted in a persistent manner by the leafhopper *Cicadulina:chinai*, is associated with three types of symptoms on infected plants: fine stripe; coarse stripe, and chlorotic stunt. Light and electron microscopy of naturally or experimentally infected maize or sorghum leaves showing any of these three symptoms revealed the presence of large, amorphous, intracytoplasmic inclusions in phloem elements, vascular parenchyma, bundle sheath, and mesophyll cells. These inclusions contained masses of long, flexuous, tubular structures, approximately 34 nm in diameter, apparently composed of helically wound filaments 5-7 nm thick. These structures commonly were associated with or sandwiched between aggregated mitochondria, some of which were degenerated. Some of the cells containing tubular structures also contained masses of loosely or densely packed fine fibrils. Purified preparations obtained from naturally infected leaves had typical nucleoprotein ultraviolet absorbance spectra and contained fine filaments 4-8 nm in diameter. Crystallized, apparently nonvirion protein also was purified from these leaves and was serologically unrelated to the noncapsid protein of maize stripe virus (MStV). Crude extracts from infected leaves did not react with antisera to the capsid protein of MStV or to several other maize viruses and spiroplasma in enzyme-linked immunosorbent assay. Similarities and differences between MYSV and tenuiviruses (rice stripe virus group) are discussed. *Phytopathology*. Mar 1990. v. 80 (3). p. 303-309. ill. Includes references. (NAL Call No.: DNAL 464.8 P56).

substomatal vesicles with primary hyphae that aborted before the formation of haustorial mother cells and/or secondary hyphae. This was correlated with a similar reaction in the nonhost. The abortion was attributed to the putatively incomplete adhesion of haustorial mother cells to mesophyll cells. In the nonhost, although no secondary hyphae were formed, some haustorial mother cells were formed, and a significant proportion of primary hyphae did not form haustorial mother cells and/or secondary hyphae. *Phytopathology*. June 1991. v. 81 (6). p. 596-602. Includes references. (NAL Call No.: DNAL 464.8 P56).

0372

### Ultrastructural morphology of *Uromyces transversalis* infection of resistant and susceptible gladiolus hosts and a nonhost, *Zea mays*.

PHYTA. Ferreira, J.F. Rijkenberg, F.H.J. St. Paul, Minn. : American Phytopathological Society. The infection structures of gladiolus rust, *Uromyces transversalis*, on and in host leaves of the susceptible gladiolus cultivar (Goldfield) and resistant species (*Gladiolus dalenii*) and in leaves of the nonhost (*Zea mays*) were examined by scanning and transmission electron microscopy. The number of germinated urediospores that formed appressoria on the resistant host was significantly fewer than the number formed on the susceptible host. The major determinant of resistance in the host was manifested in the significant proportion of

# PLANT NUTRITION

0373

## Atrazine, bifenoxy, and shade effects on crownvetch (*Coronilla varia*) nodulation and nodule activity.

WEESA6. Cardina, J. Hartwig, N.L. Champaign, Ill. : Weed Science Society of America. Studies were conducted to determine whether photosynthesis-inhibiting herbicides atrazine or bifenoxy, and shade affect the number, weight senescence, and N fixation activity of nodules on the roots of the perennial legume crownvetch. Atrazine and bifenoxy were applied at rates of 2.24 kg ai/ha to shaded and unshaded plots. The shade was varied during the growing season to simulate changing irradiance levels beneath a corn canopy. Atrazine and bifenoxy treatments reduced nodule number to 13 and 42% of the untreated control, respectively, in 1980, and 18 and 35% in 1981. Shade treatments reduced nodule number to a low of 40% of the control in 1980 and 50% in 1981. Combined effects of herbicides and shade on nodule numbers were more than additive. Nodule fresh weights were reduced an average of 37% by herbicide treatments and 39% by shade treatments. Sloughed nodule numbers decreased in the herbicide and shaded treatments, suggesting that the reduction in nodule numbers was due to fewer nodules being produced. Nodule numbers were reduced a greater percentage by herbicides and shade than was herbage dry matter production. Specific nodule activity (SNA) did not differ in nodules from the atrazine, bifenoxy, or shade treatments on the six sampling dates in 1980 or on two treatments of three sampling dates in 1981. Nomenclature: Atrazine, 6-chloro-N-ethyl-N'-(methyl ethyl)-1,3,5-triazine-2,4-diamine; bifenoxy, methyl 5-(2,4-dichlorophenoxy)-2-nitrobenzoate; crownvetch, *Coronilla varia* L. ~ CZRVA. Weed science. July 1988. v. 36 (4). p. 535-539. Includes references. (NAL Call No.: DNAL 79.8 W41).

0374

## Control of nutrient mixing and uptake by irrigation frequency and relative humidity.

AGJOAT. Kargbo, D. Skopp, J.; Knudsen, D. Madison, Wis. : American Society of Agronomy. The distribution of nutrients and water between mobile and immobile pores should influence nutrient uptake. The distribution can be regulated through control of the water-filled pore space. This research was conducted to determine the effect of varying soil-water content and water uptake upon nutrient uptake. Corn (*Zea mays* L.) was grown in a growth chamber for 2 wk at 35 or 55% relative humidity (RH). Three soils Boelus LS, 5% slope (sandy over loamy, mixed, mesic Udic Haplustoll); Boelus LS, 2% slope; and Plano Soil (fine-silty, mixed, thermic Typic Haplustoll) were watered to field capacity. Plants on each soil were allowed to extract water to one of three minimal levels before rewatering. After harvest, P and K content and other root and leaf parameters were determined. The values of minimal levels were chosen so that, for each soil, the three values ensured no low-water

stress. Effective diffusion coefficients were determined for the three soils. Increased minimal levels for a soil required for frequent watering, which led to greater mixing of solutes between pores. At 55% RH, no water treatment significantly affected P and K flux, despite significant differences in diffusion coefficients. At 35% RH, however, phosphate flux to roots increased as minimum levels increased. The significant increase of phosphate flux with more frequent watering at low RH suggests that plant uptake is affected by soil physical processes other than simple diffusion and convection to individual roots. More frequent watering results in greater mixing of solute between pores containing mobile and immobile water and, consequently, greater uptake. Agronomy journal. Nov/Dec 1991. v. 83 (6). p. 1023-1028. Includes references. (NAL Call No.: DNAL 4 AM34P).

0375

## Corn uptake and soil accumulation of nitrogen: management and hybrid effects.

SSJD4. Ferguson, R.B. Schepers, J.S.; Hergert, G.W.; Lohry, R.D. Madison, Wis. : The Society. Inefficient use of fertilizer N by corn (*Zea mays* L.) can result in the accumulation of excessive amounts of NO<sub>3</sub>(-) subject to leaching losses in the crop root zone. The fate of fertilizer N as influenced by N rate, nitrapyrin

2-chloro-6-(trichloromethyl)pyridine, and corn hybrid was evaluated in a 3-yr study with sprinkler-irrigated corn. Variables were fertilizer-N rate (75, 150, and 300 kg N/ha); nitrapyrin (0 and 0.5 kg/ha), and corn hybrid (Pioneer hybrids 3377, 3475, and 3551). Nitrogen was applied as late-sidedressed (V6-V9) NH<sub>3</sub>. The fate of fertilizer N was evaluated by measurement of apparent fertilizer-N uptake (AFU), form of N in the fertilizer band prior to and following anthesis, and accumulation and distribution of N in the soil profile. There were no significant effects of hybrid on AFU across years, and no significant hybrid X nitrapyrin interactions on AFU. Nitrapyrin significantly reduced AFU across N rates and hybrids in 2 of 3 yr. Nitrate-N concentrations in the fertilizer band, in the presence of nitrapyrin, were reduced prior to anthesis in 1986. Higher NH<sub>4</sub>(+)-N concentrations in the fertilizer band in 1986, as well as trends towards higher total inorganic-N concentrations all 3 yr following anthesis, suggest mineralization of temporarily immobilized fertilizer NH<sub>4</sub>(+). Reduced AFU in the presence of nitrapyrin in 1986 and 1987 indicates reduced availability of fertilizer N consistent with a temporary immobilization process. Nitrate accumulation in the soil to a depth of 1.8 m after three growing seasons indicates a trend toward less NO<sub>3</sub>(-) accumulation where nitrapyrin was applied at N rates of 75 and 150 kg/ha. Nitrate concentrations in the soil at a depth of 1.8 m were significantly greater at the 150 and 300 kg N/ha rates, compared with the 75 kg N/ha rate or unfertilized soil, indicating probable movement of fertilizer N below the 1.8-m depth at the higher rates. These results indicate

## (PLANT NUTRITION)

that nitrapyrin should not be applied with NH<sub>3</sub> at 1a. Soil Science Society of America journal. May/June 1991. v. 55 (3). p. 875-880. Includes references. (NAL Call No.: DNAL 56.9 SD3).

0376

**Effects of lime rate on corn root characteristics under enhanced ammonium supply.**  
JPNUDS. Dgango, K.D. Teyker, R.H. New York, N.Y. : Marcel Dekker. Plant growth under enhanced ammonium supply (EAS) can benefit from control of root-media acidification. Corn (B37XB79) was grown in a greenhouse in 18.9-L pots containing Bloomfield fine sand (coarse-loamy, mixed, mesic, Psammentic Hapludalf) with an initial pH of 5.4. Soil pH was adjusted using either CaCD<sub>3</sub> or Ca(DH)<sub>2</sub> to provide pH increments up to pH 7.4. Nitrogen (100 mg/kg) was added as (NH<sub>4</sub>)<sub>2</sub>SO<sub>4</sub>. A nitrification inhibitor was added to minimize oxidation of the NH<sub>4</sub>. Dry weights and Kjeldahl N were determined on leaves, stalks, tillers, and roots of 38 d plants. Acidity was measured from rhizosphere (pH<sub>r</sub>) and bulk (pH<sub>b</sub>) soil samples. Roots were sub-sampled for length and tissue NH<sub>4</sub> determinations. Corn growth at 38 d was not significantly affected by lime amendments. Liming with either form promoted a longer, finer root system. Root tissue NH<sub>4</sub> concentration decreased as rhizosphere pH increased for both lime forms up to a rhizosphere pH of 6.9. Rhizosphere acidification, the difference between pH<sub>r</sub> and pH<sub>b</sub>, decreased with lime rate, especially for the CaCD<sub>3</sub> form. Effects on root parameters were generally associated with pH differences and not with lime form. Journal of plant nutrition. 1991. v. 14 (2). p. 663-673. Includes references. (NAL Call No.: DNAL QK867.J67).

0377

**Effects of pH and aluminum and manganese toxicity on mycorrhizal associations with sorghum and maize /by Carlos Alberto Barbosa Medeiros.**

Medeiros, Carlos Alberto Barbosa. 1991. Thesis (Ph.D.)--University of Nebraska--Lincoln, 1991. xii, 230 leaves : ill. ; 28 cm. Includes bibliographical references. (NAL Call No.: NBU LD3656.5 1991 M434).

0378

**Effects of trifluralin on corn (*Zea mays*) growth and nutrient content.**  
WEESA6. Hartzler, R.G. Fawcett, R.S.; Taber, H.G. Champaign, Ill. : Weed Science Society of America. Glasshouse experiments were conducted to determine the effects of trifluralin on root growth and mineral relations of corn seedlings. Root weight to shoot weight ratios of corn seedlings were positively correlated to concentrations of trifluralin in soil. Root length to shoot weight ratios, however, were inversely related to trifluralin concentrations. Phosphorous and potassium

concentrations in shoot tissue were reduced 60 and 35%, respectively, by 0.25 mg trifluralin kg<sup>-1</sup> soil. Growth inhibition due to trifluralin was partially overcome by supplementing soil with nutrients. Weed science. Nov 1990. v. 38 (6). p. 468-470. Includes references. (NAL Call No.: DNAL 79.8 W41).

0379

**Grain yield, stalk rot, and mineral concentration of fertigated corn as influenced by N P K.**  
JPNUDS. Bullock, D.G. Gascho, G.J.; Sumner, D.R. New York, N.Y. : Marcel Dekker. Journal of plant nutrition. 1990. v. 13 (8). p. 915-937. Includes references. (NAL Call No.: DNAL QK867.J67).

0380

**Induction of nitrate transport in maize roots, and kinetics of influx, measured with nitrogen-13.**  
PLPFA. Hole, D.J. Emran, A.M.; Fares, Y.; Drew, M.C. Rockville, Md. : American Society of Plant Physiologists. Unlike phosphate or potassium transport, uptake of nitrate by roots is induced, in part, by contact with the substrate ion. Plasmalemma influx <sup>13</sup>N-labeled nitrate in maize roots was studied in relation to induction of the uptake system, and the influence of short-term N starvation. Maize (*Zea mays*) roots not previously exposed to nitrate had a constitutive transport system (state 1), but influx increased 250% during six hours of contact with 100 micromolar nitrate, by which time the transport mechanism appeared to be fully synthesized (state 2). A three-day period of N starvation prior to induction and measurement of nitrate influx resulted in a greater capacity to transport nitrate than in unstarved controls, but this was fully expressed only if roots were kept in contact with nitrate for the six hours needed for full induction (state 2E). A kinetic analysis indicated a 160% increase in maximum influx in N-starved, induced roots with a small decrease in Km. The inducible component to nitrate influx was induced only by contact with nitrate. Full expression of the nitrate inducible transport system was dependent upon mRNA synthesis. An inhibitor of cytoplasmic protein synthesis (cycloheximide) eliminated the formation of the transport system while inhibition by chloramphenicol of mitochondrial- or plastid-coded protein synthesis had no effect. Poisoning of membrane-bound proteins effectively disabled both the constitutive and induced transport systems. Plant physiology. June 1990. v. 93 (2). p. 642-647. Includes references. (NAL Call No.: DNAL 450 P692).

## (PLANT NUTRITION)

0381

### Influence of plant spacing and nitrogen fertilization in maize on *Dalbulus maidis* (Homoptera: Cicadellidae), vector of corn stunt.

EVETEX. Power, A.G. Lanham, Md. : Entomological Society of America. The incidence of the corn stunt pathogen transmitted to maize by the corn leafhopper, *Dalbulus maidis* (Delong and Wolcott), was reduced in high-density plantings of maize (*Zea mays mays L.*) in Nicaragua. Density was manipulated by modifying the distance between rows or between plants within a row. Although leafhopper populations were not strongly influenced by planting density in this study, the planting arrangement significantly affected leafhopper abundance. At equivalent planting densities, leafhoppers were more abundant in treatments with reduced between-row spacing. This difference was not reflected in the incidence of corn stunt, which tended to be lower in treatments with reduced row spacing. This result can be explained by the effects of planting arrangement on leafhopper movement. In contrast to a previous study, nitrogen fertilization affected maize growth early in the season, but did not significantly influence vector abundance or disease incidence. Environmental entomology. June 1989. v. 18 (3). p. 494-498. Includes references. (NAL Call No.: DNAL QL461.E532).

0382

### Iron deficiency stress response of various C-3 and C-4 grain crop genotypes: strategy II mechanism evaluated.

JPNUDS. Lytle, C.M. Jolley, V.D. New York, N.Y. : Marcel Dekker. The relative amount of phytosiderophore produced by various Strategy II plants has been categorized as follows: barley (*Hordeum vulgare L.*) > wheat (*Triticum aestivum L.*) > oat (*Avena byzantina C. Koch.*) > rye (*Secale cereale L.*) much greater than corn (*Zea mays L.*) much greater than sorghum (*Sorghum bicolor (L.) Moench*) > rice (*Oryza sativa L.*). With the exception of rice, these plants developed under oxidized soil conditions, and the C-3 species produce more phytosiderophore than C-4 species under Fe-deficiency stress. Iron-efficient Coker 227 oat produced phytosiderophore in response to Fe-deficiency stress, while Fe-inefficient TAM O-312 oat did not. Although Fe-efficient WF9 corn and Fe-inefficient ys1 corn differed in their ability to obtain Fe, neither produced sufficient quantities of phytosiderophore to explain these differences. The objectives of this research were to determine: (a) if phytosiderophore production of Fe-deficiency stressed C-4 species millet (*Panicum miliaceum L.*) and corn is low or absent compared to identically stressed C-3 species oat and barley, and (b) if native, inbred and hybrid corn cultivars differ in ability to produce and utilize phytosiderophores. Although release of phytosiderophore for Fe-stressed corn and millet was generally lower than oat, quantity of release was not always related to obtaining Fe and maintaining green plants. Barley maintained high Fe and low chlorosis with

a minor release of phytosiderophore. Oat with increased release acted similarly to barley, whereas a relatively high release of phytosiderophore from White maize did not effect Fe uptake or greening. Likewise, small amounts of phytosiderophore were produced by all corn types, but corn was generally unable to obtain adequate Fe from the growth medium. Two of the native corns, Coneso and Tepecintle, maintained relatively low chlorosis, but they differed in phytosiderophore release. Thus, it appears that the C-4 plants studied herein generally release. Journal of plant nutrition. 1991. v. 14 (4). p. 341-361. Includes references. (NAL Call No.: DNAL QK867.J67).

0383

### Irrigated corn response to soil-test indices and fertilizer nitrogen, phosphorous, potassium, and magnesium.

SSJD4. Obreza, T.A. Rhoads, F.M. Madison, Wis. : The Society. Improved soil-water management techniques have made irrigated corn (*Zea mays L.*) yields of more than 12.5 Mg ha<sup>-1</sup> possible in the southeastern USA. Data relating fertilizer rates and soil test indices to grain yield under intensive water management are needed to maximize fertilizer use efficiency. The objective of this study was to generate fertility index-yield response data from which critical levels of Mehlich 1 soil test P, K, and Mg could be calculated. Irrigated corn was grown at Quincy, FL during 1980 and 1981. Nitrogen was applied at 168, 336, and 504 kg ha<sup>-1</sup>, P at 0, 29, 59, and 118 kg ha<sup>-1</sup>, K at 0, 209, and 418 kg ha<sup>-1</sup>, and Mg at 0, 67, and 134 kg ha<sup>-1</sup> in a total of 11 treatments. Indices of available nutrients were measured via the Mehlich 1 soil test prior to each season. For both years, a minimum application of 168 kg ha<sup>-1</sup> of N, 29 kg ha<sup>-1</sup> of P, and 0 kg ha<sup>-1</sup> of Mg was required for maximum grain yield, which averaged 11.2 Mg ha<sup>-1</sup>. For K, maximum yield occurred with minimum applications of 209 and 0 kg ha<sup>-1</sup> in 1980 and 1981, respectively. Calculated critical Mehlich 1 soil test levels were 9, 45, and 33 mg kg<sup>-1</sup> for P, K, and Mg, respectively. Comparison of our results with current soil test rating categories and corresponding recommended fertilizer rates indicated that maximum corn yield was obtained with a P fertilizer rate which was 50 kg ha<sup>-1</sup> lower than the recommended rate. Soil Science Society of America journal. May/June 1988. v. 52 (3). p. 701-706. Includes references. (NAL Call No.: DNAL 56.9 S03).

0384

### Nitrapyrin, terrazole, atrazine and simazine influence on denitrification and corn growth.

JPNUDS. Somda, Z.C. Phatak, S.C.; Mills, H.A. New York, N.Y. : Marcel Dekker. Journal of plant nutrition. 1990. v. 13 (9). p. 1195-1208. Includes references. (NAL Call No.: DNAL QK867.J67).

(PLANT NUTRITION)

0385

Nitrapyrin, terrazole, atrazine, and simazine influence on nitrification and corn growth. JPNUDS. Somda, Z.C. Mills, H.A.; Phatak, S.C. New York, N.Y. : Marcel Dekker. Journal of plant nutrition. 1990. v. 13 (9). p. 1179-1193. Includes references. (NAL Call No.: DNAL QK867.J67).

0386

Optimal fertilizer nitrogen and residual nitrate-nitrogen levels for irrigated corn and effects of nitrogen limitations: an economic analysis. JUPRAEN. Stoecker, A.L. Onken, A.B. Madison, Wis. : American Society of Agronomy. Journal of production agriculture. Oct/Dec 1989. v. 2 (4). p. 309-317. Includes references. (NAL Call No.: DNAL S539.5.J68).

0387

Plants can utilize iron from Fe-N,N'-DI-(2-hydroxybenzoyl)-ethylenediamine--N,N'-diacetic acid, a ferric chelate with 10(6) greater formation constant than Fe-EDDHA. JPNUDS. Chaney, R.L. New York, N.Y. : Marcel Dekker. Journal of plant nutrition. Paper presented at the "Fourth International Symposium on Iron Nutrition and Interactions in Plants," July 6-9, 1987, University of New Mexico, Albuquerque. June/Nov 1988. v. 11 (6/11). p. 1033-1050. ill. Includes references. (NAL Call No.: DNAL QK867.J67).

0388

Response of ammonium assimilation enzymes to nitrogen form treatments in different plant species. JPNUDS. Magalhaes, J.R. Huber, D.M. New York, N.Y. : Marcel Dekker. This series of experiments studied N metabolism in tomato, rice and corn. Ammonium ( $\text{NH}_4^+$ ), as a sole source of N, reduced tomato and corn growth, but not rice growth. Tomato showed the most severe  $\text{NH}_4^+$  toxicity. Ammonium assimilation enzyme activity differed greatly among the species. Rice had much higher glutamine synthetase (GS) activity than corn and tomato with  $\text{NH}_4^+$  nutrition. GS activity was especially high in shoot tissue. Ammonium induced high activity of glutamate dehydrogenase (GDH) in roots of tomato but not in rice. GS activity in rice increased as the level of  $\text{NH}_4^+$  increased; and it was higher in shoots than roots, indicating GS activity as a key factor in the detoxification and metabolism of  $\text{NH}_4^+$  in green tissues of efficient plant species. Journal of plant nutrition. 1991. v. 14 (2). p. 175-185. Includes references. (NAL Call No.: DNAL QK867.J67).

0389

Response of different plants to ammonium and nitrate as sources of nitrogen with application of fungicides. JPNUDS. Feng, J. Barker, A.V. New York, N.Y. : Marcel Dekker. Journal of plant nutrition. 1990. v. 13 (5). p. 495-512. Includes references. (NAL Call No.: DNAL QK867.J67).

0390

Some effects of mineral nutrition on aflatoxin contamination of corn and peanuts. Wilson, D.M. Walker, M.E.; Gascho, G.J. St. Paul, Minn. : APS Press, c1989. Soilborne plant pathogens : management of diseases with macro- and microelements / edited by Arthur W. Engelhard. p. 137-151. Includes references. (NAL Call No.: DNAL SB732.87.S66).

0391

Temporal effects of subsoil compaction on soil strength and plant growth. SSSJD4. Lowery, B. Schuler, R.T. Madison, Wis. : The Society. In recent years, scientists have become concerned that heavy farm equipment is causing soil compaction below the nominal depth of tillage. Compaction this deep may not be ameliorated after one season's freeze-thaw and wet-dry cycles. Experiments were conducted on a Kewaunee (fine, mixed, mesic Typic Hapludalf) and Rozetta (fine-silty, mixed, mesic Typic Hapludalf) soil to determine the duration and effect of subsoil compaction on soil strength and corn (*Zea mays L.*) growth. Soil at two sites was compacted with 8 and 12.5 Mg axle loads in the spring of 1983. Cone-penetration resistance of compacted soil was significantly higher than that of uncompacted soil below the plow zone. Plant heights, at physiological maturity averaged across both sites, were reduced 13 and 26% on the 8- and 12.5-Mg compaction treatments, respectively, compared with the control in 1983. In 1984, average mature plant heights were 2.4, 2.3, and 2.3 m for the control 8-, and 12.5-Mg compaction, respectively. Three years after the compaction was applied (1986), the average mature plant height for the 8- and 12.5-Mg compacted sites were reduced 3.1 and 4.3% compared with the control. Nitrogen and K uptake was reduced by compaction. Iron, Al, and Mn uptake increased with increasing levels of compaction on the Kewaunee soil in 1983. In 1983, yields for the 8- and 12.5-Mg treatments on the Rozetta soil were reduced 4 and 14%, respectively, relative to the control. Similarly, yields for the Kewaunee soil were reduced 14 and 43%. Yields for the Kewaunee soil were not reduced by compaction in 1984, although 5 and 9% reductions were observed at the Rozetta site. Yields were not affected the following 2 yr (1985 and 1986), whereas the resistance to cone penetration was significantly in the compacted plots compared with the control. Soil Science Society of America journal. Jan/Feb 1991. v. 55 (1). p. 216-223. Includes references. (NAL Call No.: DNAL S6.9 S03).

## (PLANT NUTRITION)

0392

Tillage effects on availability nitrogen to corn following a winter green manure crop. SSSJD4. Sarrantonio, M. Scott, T.W. Madison, Wis. : The Society. Field studies were conducted in 1984 through 1986 to investigate the release of inorganic N to corn (*Zea mays L.*) following a winter annual green manure crop of hairy vetch (*Vicia villosa Roth*) that had either been plowed down to 22 cm (conventional tillage, CT), or killed and left on the surface (no-till, NT). Soil samples were taken regularly throughout the season at three depths (0-7.5 cm, 7.5-22 cm and 22-45 cm) and analyzed for inorganic N. Crop growth and N uptake, as well as various other plant, soil and environmental parameters were also monitored. First year data (1985) show that soil inorganic N concentration in vetch treatments was higher under CT than NT, and it was more evenly distributed throughout the plow layer. Both corn yields and N uptake, however, were significantly higher in the NT system, probably because of higher soil moisture content in a dry summer. Vetch did not stimulate significant yield increases over O-N control plots in either tillage system, although there was greater N uptake by corn in vetch treatments. Under NT, 29% of the original N in the above-ground vetch biomass was measured either as soil inorganic N or corn N. Under CT, 56% of the original vetch N was measured. A repeat of the first experiment was conducted in 1986. Again, higher levels of inorganic N occurred under CT than under NT where vetch had been grown. Contrary to the results of 1985, corn yields were significantly higher in CT treatments than NT treatments at all N levels, and both corn yield and N uptake were significantly higher in vetch treatments than control treatments under both tillage systems. Maximum inorganic N levels were measured in late October in 1986, when 22% and 55% of the original vetch N was measured under NT and CT tillage systems, respectively. Soil Science Society of America journal. Nov/Dec 1988. v. 52 (6). p. 1661-1668. Includes references. (NAL Call No.: DNAL 56.9 S03).

for obtaining maximum or near-maximum yields. When yields were near maximum, stalk NO<sub>3</sub>- concentrations increased linearly with amounts of N fertilizer applied. Stalk samples collected at various times after black layering showed that NO<sub>3</sub>- concentrations remained constant for at least 2 wk. These observations suggest that stalk NO<sub>3</sub>- concentration offers great potential as the basis for a tissue test to characterize degree of N excess during corn production. Agronomy journal. Jan/Feb 1990. v. 82 (1). p. 124-129. Includes references. (NAL Call No.: DNAL 4 AM34P).

0393

### Tissue test for excess nitrogen during corn production.

AGJOAT. Binford, G.D. Blackmer, A.M.; El-Hout, N.M. Madison, Wis. : American Society of Agronomy. Seeming conflict between the need to use N fertilizers and the need to protect groundwater quality requires better tools for distinguishing between fertilizer applications that are essential and those that are excessive. Studies were conducted to evaluate NO<sub>3</sub>- concentration in corn (*Zea mays L.*) stalks at physiological maturity as the basis for a tissue test to characterize degree of N excess during corn production. Samples of the lower portion of corn stalks were collected from plots in N-rate experiments at 18 site-years in Iowa. Observed relationships between grain yields and stalk NO<sub>3</sub>- concentrations indicated sharp breaks between NO<sub>3</sub>- concentrations that were not adequate and those that were adequate

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0394

**Accumulation of polychlorobiphenyl congeners and p,p-DDE at environmental concentrations by corn and beans.**

EESAD. Shane, L.A. Bush, B. Duluth, Minn. : Academic Press. Ecotoxicology and environmental safety. Feb 1989. v. 17 (1). p. 38-46. Includes references. (NAL Call No.: DNAL QH545.A1E29).

0395

**Aflatoxin contamination in selected corn germplasm classified for resistance to European corn borer (Lepidoptera: Noctuidae).**

JESCEP. McMillian, W.W. Widstrom, N.W.; Barry, D.; Lillehoj, E.B. Tifton, Ga. : The Entomological Science Society. Journal of entomological science. July 1988. v. 23 (3). p. 240-244. Includes references. (NAL Call No.: DNAL QL461.G4).

0396

**Alfalfa autotoxic fraction characterization and initial separation.**

CRPSAY. Hall, M.H. Henderlong, P.R. Madison, Wis. : Crop Science Society of America. Alfalfa (*Medicago sativa* L.) has been reported as having autotoxic or autoallelopathic characteristics, but the plant fraction containing the autotoxic material and the responsible compound have not been isolated or identified. Greenhouse and laboratory studies were conducted to: (i) determine if 'Vanguard' alfalfa exhibits autotoxicity, (ii) determine which plant fraction contains the autotoxic material, and (iii) separate the autotoxic fraction using paper chromatography procedures. In greenhouse studies, alfalfa plant material reduced alfalfa emergence by an average of 87 and 62% in a Kokomo silty loam soil (fine, mixed mesic, Typic Argiaquoll) previously cropped with alfalfa and corn (*Zea mays* L.), respectively. Incubating the soil and plant material under two contrasting moisture regimes did not alter the inhibitory activity. However, autoclaving the soil and plant material negated the autotoxic response. Laboratory studies indicate that the autotoxic compound was contained within the water-extractable alfalfa fraction, and was not the direct result of microbial activity, although microbial activity may increase the dissipation of the compound. Ascending paper chromatographic separation indicated that the autotoxic compound had an R<sub>f</sub> characterization similar to phenolic acid; however, phenolic-absorbent polyvinylpoly-pryrrolidone did not affect the autotoxic response. The results indicate that alfalfa contains a water-soluble autotoxic compound that has characteristics indicative of a phenolic compound. Crop science. Mar/Apr. 1989. v. 29 (2). p. 425-428. Includes references. (NAL Call No.: ONAL 64.8 C883).

0397

**Bioengineers' quest: drought-safe plants.**

Gladwell, M. Washington, D.C. : The Washington Post Co. The Washington post. July 23, 1990. p. A3. (NAL Call No.: DNAL A00069).

0398

**Chlorimuron ethyl metabolism in corn.**

PCPB. Lamoureux, G.L. Rusness, D.G.; Tanaka, F.S. Orlando, Fla. : Academic Press.

<sup>14</sup>C chlorimuron ethyl was readily absorbed by the roots of young intact corn seedlings and through the cut ends of excised leaves, but it was not readily absorbed by intact leaves. Under the conditions employed, <sup>14</sup>C chlorimuron ethyl was metabolized at a moderate rate in both intact roots and excised leaves (ca. 2.4 mmol/g fresh wt tissue/hr). Based upon high-performance liquid chromatography (HPLC) analysis, <sup>14</sup>C chlorimuron ethyl appeared to be metabolized by similar routes in both the roots and leaves. <sup>14</sup>C chlorimuron ethyl and 10 radioactive metabolites were detected in the roots of corn 7 hr following herbicide treatment. <sup>14</sup>C chlorimuron ethyl and seven metabolites, listed in approximate order of their abundance, were isolated and characterized: chlorimuron ethyl (N-(4-chloro-6-methoxypyrimidine-2-yl)-N'-(2-ethoxycarbonylbenzenesulfonyl)urea; (I) N-(4-chloro-5-hydroxy-6-methoxypyrimidine-2-yl)-N'-(2-ethoxycarbonylbenzenesulfonyl)urea, (II) 2-ethoxycarbonylbenzene sulfonamide, (IV) N-(4-S-glutathionyl-6-methoxypyrimidine-2-yl)-N'-(2-ethoxycarbonylbenzenesulfonyl)urea, (VI) N-(4-S-glutathionyl-5-hydroxy-6-methoxypyrimidine-2-yl)-N'-(2-ethoxycarbonylbenzenesulfonyl)urea, (III) N-(4-chloro-5-O-beta-D-glucosyl-6-methoxypyrimidine-2-yl)-N'-(2-ethoxycarbonylbenzenesulfonyl)urea, (VII) N-(4-chloro-6-methoxypyrimidine-2-yl)-N'-(2-ethoxy-O-beta-D-glucosyl benzenesulfonyl)urea, and (V) N-(4-S-cysteinyl-6-methoxypyrimidine-2-yl)-N'-(2-ethoxycarbonylbenzenesulfonyl)urea. Chlorimuron ethyl and these metabolites were purified by HPLC and were characterized by fast atom bombardment mass spectrometry (FAB MS). In addition to FAB MS, the following methods were used in the characterization of some metabolites: synthesis, hydrolysis with beta-glucosidase, analysis of hydrolysis products, electron impact mass spectrometry, and proton nuclear magnetic resonance (400 MHz). Pesticide biochemistry and physiology. Sept 1991. v. 41 (1). p. 66-81. Includes references. (NAL Call No.: DNAL SB951.P49).

## (PLANT PHYSIOLOGY AND BIOCHEMISTRY)

0399

### Corn growth response to temperature: rate and duration of leaf emergence.

AGJOAT. Hesketh, J.D. Warrington, I.J. Madison, Wis. : American Society of Agronomy. Seasonal predictions of gas and energy exchange in crop canopies require a quantitative description of temperature effects on leaf area development. Such predictions are needed in crop management and forecasting models. Our objectives were to quantify temperature effects on leaf emergence rates, determined as lengths and areas of fully expanded emerged leaf material, and their duration in corn (*Zea mays* L.). Hybrids were grown in controlled environments under 16 temperature regimes ranging from 16/11 to 38/33 degrees C (12-h day/night thermal periods). Plants were dissected every 3 to 10 d, depending on the temperature, to determine the mainstem node number associated with the youngest leaf primordium as well as weight, area, and length per leaf. The node number of the youngest leaf showing a ligule was recorded. Leaf emergence rates, either as lengths or areas per unit time, and the node associated with the youngest visible leaf tip were derived from time plots of emerged leaf lengths and area. Emergence duration was estimated three ways: (i) the time between appropriate leaf developmental events, from time plots, (ii) mature leaf length divided by its extension rate, and (iii) mature leaf area divided by its area emergence rate. Primordia and ligule appearance rates derived from these data were published earlier. The relationships between temperature and tip appearance rates, leaf emergence rates, and the reciprocals of the various estimates of duration were determined; threshold temperatures and degree day requirements for processes derived from such plots are presented. Other information is provided for developing logic for predicting temperature effects on the development of canopy leaf area in corn. *Agronomy journal.* July/Aug 1989; v. 81 (4). p. 696-701. Includes references. (NAL Call No.: DNAL 4 AM34P).

0400

### Corn growth retardation resulting from soybean herbicide residues.

OJSCA. Beuerlein, M. Loux, M.; Beuerlein, J. Columbus, Ohio : Ohio Academy of Science. *Ohio journal of science.* June 1990. v. 90 (3). p. 67-70. Includes references. (NAL Call No.: DNAL 410 OH3).

0401

### Correlations between gravitropic curvature and auxin movement across gravistimulated roots of *Zea mays*.

PLPHA. Young, L.M. Evans, M.L.; Hertel, R. Rockville, Md. : American Society of Plant Physiologists. We compared the kinetics of auxin redistribution across the caps of primary roots of 2-day-old maize (*Zea mays*, cv Merit) seedlings with the time course of gravitropic curvature. <sup>3</sup>H indoleacetic acid was applied

to one side of the cap in an agar donor and radioactivity moving across the cap was collected in an agar receiver applied to the opposite side. Upon gravistimulation the roots first curved upward slightly, then returned to the horizontal and began curving downward, reaching a final angle of about 67 degrees. Movement of label across the caps of gravistimulated roots was asymmetric with preferential downward movement (ratio downward/upward = ca. 1.6, radioactivity collected during the 90 min following beginning of gravistimulation). There was a close correlation between the development of asymmetric auxin movement across the root cap and the rate of curvature, with both values increasing to a maximum and then declining as the roots approached the final angle of curvature. In roots preadapted to gravity (alternate brief stimulation on opposite flanks over a period of 1 hour) the initial phase of upward curvature was eliminated and downward bending began earlier than for controls. The correlation between asymmetric auxin movement and the kinetics of curvature also held in comparisons between control and preadapted roots. Both downward auxin transport asymmetry and downward curvature occurred earlier in preadapted roots than in controls. These findings are consistent with suggestions that the root cap is not only the site of perception but also the location of the initial redistribution of effectors that ultimately leads to curvature. *Plant physiology.* Mar 1990. v. 92 (3). p. 792-796. Includes references. (NAL Call No.: DNAL 450 P692).

0402

### Cyclohexanedione herbicides are selective and potent inhibitors of acetyl-CoA carboxylase from grasses.

PLPHA. Rendina, A.R. Felts, J.M. Rockville, Md. : American Society of Plant Physiologists. *Plant physiology.* Apr 1988. v. 86 (4). p. 983-986. Includes references. (NAL Call No.: DNAL 450 P692).

0403

### Cysteine, gamma-glutamylcysteine, and glutathione levels in maize seedlings. Distribution and translocation in normal and cadmium-exposed plants.

PLPHA. Rauser, W.E. Schupp, R.; Rennenberg, H. Rockville, Md. : American Society of Plant Physiologists. The levels of cysteine (Cys), gamma-glutamylcysteine (gamma EC), and glutathione (GSH) were measured in the endosperms, scutella, roots, and shoots of maize (*Zea mays* L.) seedlings. GSH was the major thiol in roots, shoots, and scutella. Cys predominated in endosperms. The endosperm, scutellum, and functional phloem translocation were required for maintenance of GSH pools in roots and shoots of 6-day-old seedlings. Exposure of roots to 3 micromolar Cd, besides causing a decline in GSH, caused an accumulation of gamma EC, as if the activity of GSH synthetase was reduced in vivo. <sup>35</sup>S Cys

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injected into endosperms of seedlings was partly metabolized to 35S sulfate. The scutella absorbed both 35S sulfate and 35S Cys and transformed 68 to 87% of the radioactivity into 35S GSH. 35S GSH was translocated to roots and shoots in proportion to the tissue fresh weight. Taken together, the data supported the hypothesis that Cys from the endosperm is absorbed by the scutellum and used to synthesize GSH for transfer through the phloem to the root and shoot. The estimated flux of GSH to the roots was 35 to 60 nanomoles per gram per hour, which totally accounted for the small gain in GSH in roots between days 6 and 7. For Cd-treated roots the GSH influx was similar, yet the GSH pool did not recover to control levels within 24 hours. The estimated flux of GSH to the entire shoot was like that to the roots; however, it was low (11-13 nanomoles per gram per hour) to the first leaf and high (76-135 nanomoles per gram per hour) to the second and younger leaves. Plant physiology. Sept 1991. v. 97 (1). p. 128-138. Includes references. (NAL Call No.: DNAL 450 P692).

### 0404

#### Defoliation effects on grain filling of R-nj color-selected maize strains.

CRPSAY. Mostafavi, M.R. Cross, H.Z. Madison, Wis. : Crop Science Society of America. Grain yield in maize (*Zea mays L.*) is often related to rate and duration of grain filling, which can be influenced by selection for R-nj aleurone color expression. This study was conducted to determine how modifying the source/sink ratio affects grain-filling characteristics and R-nj color expression from two genetic backgrounds. Field experiments were conducted at Fargo, ND, with six synthetic strains derived from NDSF (early maturing) and NDSC (late maturing) and divergently selected for R-nj color expression. A single plant from each plot was tagged and pollinated with bulked pollen from 'Cudu', a source homozygous for R-nj. Three defoliation treatments (0, 50, and 100%) were applied at silking. Four sequential 15-kernel samples five each from the apical, mid-ear, and basal sections of the ears) were taken at 3- to 4-d intervals from alternate kernel rows during the linear phase of grain filling and at kernel maturity. Combined analyses of data over years indicated that source reduction (defoliation) reduced color intensity (CI), rate of dry matter accumulation (RDMA), and kernel weight. Strains selected for high color expression had higher RDMA and kernel weight than low color selections. As expected, the CI ratings corresponded to color selection groups. Color expression was positively correlated with RDMA and kernel weight. Results suggest that R-nj color expression is related to sugar concentration in the endosperm during kernel development, and that selection for differences in color expression may be a simple, inexpensive means of modifying RDMA. Crop science. Mar/Apr 1990. v. 30 (2). p. 358-362. Includes references. (NAL Call No.: DNAL 64.8 C883).

### 0405

#### Development and growth of tropical maize at two elevations in Hawaii.

AGJOAT. Manrique, L.A. Hodges, T. Madison, Wis. : American Society of Agronomy. Development and growth response of maize (*Zea mays L.*) to an increase in temperature and daylength has been studied in temperate regions, but little is known of the effects of daylength on leaf number, leaf area development, and grain yield in tropical environments. A temperature-by-daylength experiment was conducted in the field on the Island of Maui, Hawaii (USA) at 282 and 640 m elevations during summer 1988 to examine the effects of daylength and temperature on leaf number, leaf area index (LAI), and grain yield of Pioneer hybrid X304C. Under high nutrient fertility and adequate water supply, plants were grown at natural daylength (12-13.5 h, control), control + 0.5-h, 14-, 17-, and 20-h daylengths. These daylengths were artificially produced by extending the natural daylength with 500-W lamps. For a 97-d period, mean maximum air temperatures were 26.8 and 27.8 degrees C while minimum air temperatures for the same period were 20.1 and 16.4 degrees C at the 282 and 640 m elevations, respectively. Longer days reduced mature leaf appearance rate and delayed tassel initiation and tasseling. Leaf tip appearance rate was unaffected by daylength but leaves took more thermal time for full expansion. Leaf area index in the 17- and 20-h daylengths was 7.0 at 77 d after planting, which was 1.8 times the LAI in the control and 14-h daylengths. Physiological maturity in the 17-h daylength was delayed by 33.5 and 38.5 d at 282 and 640 m, respectively. Maturity in the 20-h daylength was delayed by 41.0 and 48.5 d at 282 and 640 m, respectively. Grain yields and harvest indices at both elevations decreased significantly with increasing daylength. Overall, warm temperatures at 282 m enhanced the adverse effects of daylength on grain yield. Agronomy journal. Mar/Apr 1991. v. 83 (2). p. 305-310. Includes references. (NAL Call No.: DNAL 4 AM34P).

### 0406

#### Developmental and growth effects of crop residues on corn.

AGJOAT. Fortin, M.C. Pierce, F.J. Madison, Wis. : American Society of Agronomy. Residue-related low soil temperatures have been shown to delay corn (*Zea mays L.*) emergence and silking dates, but it is unclear how residues affect general crop growth during this period. This study was conducted to determine how crop-residue effect on corn development during the vegetative stage affects the measurements of various growth characteristics. The effects of small grain residue cover applied around 50% emergence on corn development (time to reach specific stages), growth (aboveground phytomass, height, N uptake) and soil temperatures were investigated on a Conover loam (mixed, mesic, Udolic Ochraqualf) under irrigated no-tillage conditions. In 1987 and 1988, straw mulch significantly delayed development when compared to a bare soil control, but no consistent

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difference was found in aboveground phytomass when comparisons were done at similar vegetative stages. Comparisons on a calendar day basis showed significantly lower values for the residue treatment. The latter analysis confounded developmental-delay effects with actual growth. Similar observations were made for height and N uptake. Consequently, an understanding of plant performance in tillage studies, involving significant developmental differences between treatments, requires that the response curve of a growth characteristic over time be coupled with data on development. *Agronomy journal*. July/Aug 1990. v. 82 (4). p. 710-715. Includes references. (NAL Call No.: DNAL 4 AM34P).

Includes references. (NAL Call No.: DNAL QH540.J6).

### 0409

**Dominant mutations causing alterations in acetyl-coenzyme A carboxylase confer tolerance to cyclohexanone and aryloxyphenoxypropionate herbicides in maize.** PNASA. Parker, W.B. Marshall, L.C.; Burton, J.D.; Somers, D.A.; Wyse, D.L.; Gronwald, J.W.; Gengenbach, B.G. Washington, D.C. : The Academy. *Proceedings of the National Academy of Sciences of the United States of America*. Sept 1990. v. 87 (18). p. 7175-7179. ill. Includes references. (NAL Call No.: DNAL 500 N21P).

### 0407

**Different alleles of *Ustilago maydis* are necessary for maintenance of filamentous growth but not for meiosis.**

PNASA. Banuett, F. Herskowitz, I. Washington, D.C. : The Academy. *Proceedings of the National Academy of Sciences of the United States of America*. Aug 1989. v. 86 (15). p. 5878-5882. ill. Includes references. (NAL Call No.: DNAL 500 N21P).

### 0410

**Effects of aliphatic acids on seed germination and seedling growth in soil.**

CSOSA2. Krogmeier, M.J. Bremner, J.M. New York, N.Y. : Marcel Dekker. *Communications in soil science and plant analysis*. 1990. v. 21 (7/8). p. 547-555. Includes references. (NAL Call No.: DNAL S590.C63).

### 0408

**Direct effects of simulated acid rain on sexual reproduction in corn.**

JEVQAA. DuBay, D.T. Madison, Wis. : American Society of Agronomy. The process of sexual reproduction in flowering plants often exposes pollen grains to the environment and the potential effects of atmospheric deposition. Experiments were designed to determine whether simulated acid rain treatments just before or after pollination could adversely influence reproductive processes and seed set in corn (*Zea mays* L.). Container-grown corn with sexually mature tassels and ears were exposed once to simulated rain at four pH levels for 1 h, beginning 1 h after artificial pollination or ending 10 min before artificial pollination. The single, artificial pollination deposited an average of 85 pollen grains per silk. Simulated rain treatment at pH 4.5, 3.5, or 2.5 after pollination reduced the percentage seed set of treated ears 7, 29, and 34%, respectively, as compared with pH 5.5. Simulated rain at pH 5.5 after pollination reduced seed set 24% as compared with no-rain controls. The pH of simulated rain applied before pollination did not affect seed set, and pH 5.5 rain applied before pollination had no effects on seed set compared to no-rain controls. Microscopic observations indicated that pollen germination and pollen tube penetration of the silk were completed by the time the rain treatments began 1 h after pollination. This infers that simulated acid rain influenced pollen tubes after they entered the silks. These results suggest that plant sexual reproduction could be adversely affected by acidic precipitation at pH levels observed for rain events in eastern North America. *Journal of environmental quality*. Apr/June 1989. v. 18 (2). p. 217-221.

### 0411

**Effects of CGA-154281 and temperature on metolachlor absorption and metabolism, glutathione content, and glutathione-S-transferase activity in corn (*Ze a mays*).**

WEESA6. Viger, P.R. Eberlein, C.V.; Fuerst, E.P.; Gronwald, J.W. Champaign, Ill. : Weed Science Society of America. CGA-154281 and temperature effects on metolachlor absorption and metabolism were studied in corn seedlings grown in untreated soil or soil treated with metolachlor, CGA-154281, or both. Seedlings were grown under a cool (21/13 C, 16-h day) or warm (30/21 C, 16-h day) temperature regime and exposed to <sup>14</sup>C-metolachlor for 10 min at either 21 or 30 C. Corn grown under the cool temperature regime absorbed slightly more <sup>14</sup>C-metolachlor than corn grown under the warm temperature regime. Corn held at 21 C during a 10-min <sup>14</sup>C-metolachlor exposure period metabolized metolachlor more slowly than corn held at 30 C. Decreased corn tolerance to metolachlor observed at lower temperatures may be due in part to slower metolachlor metabolism. Corn grown in the presence of metolachlor plus CGA-154281 metabolized <sup>14</sup>C-metolachlor to the glutathione conjugate twice as fast as corn grown in the presence of metolachlor alone. The increase in metabolism rate was due to a fivefold increase in glutathione-S-transferase (GST, EC 2.5.1.18) activity and not to an increase in glutathione (GSH) content. Results are consistent with the hypothesis that CGA-154281 protects corn from metolachlor injury by enhancing GST activity, which accelerates metolachlor detoxification via GSH conjugation. *Weed science*. July/Sept 1991. v. 39 (3). p. 324-328. Includes references. (NAL Call No.: DNAL 79.8 W41).

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0412

**Effects of European corn borer (Lepidoptera: Pyralidae) tunneling and drought stress on field corn gas exchange parameters.**  
JEENAI, Godfrey, L.D. Holtzer, T.O.; Norman, J.M. Lanham, Md. : Entomological Society of America. The influence of European corn borer, *Ostrinia nubilalis* (Hubner), larval tunneling on corn (*Zea mays* L.) gas exchange parameters was examined in a 2-yr field study. Manual larval infestations were established in corn (two planting dates per year) grown on a soil moisture gradient. Larval tunneling significantly reduced the corn photosynthetic rate compared with uninfested plants by 11.4 and 22.1% in 1987 for 3 and 5 larvae per plant infestations, respectively, whereas the 1 larva per plant infestation significantly increased the photosynthetic rate. In 1988, when the drought stress was not as severe as in 1987, only the high infestation rate affected the photosynthetic rate (an 11.7% reduction). Other consequences of larval tunneling were reduced stomatal conductance (up to 28.1%), decreased intercellular CO<sub>2</sub> concentration, and increased leaf temperature (up to 1.8 degrees C). The interactions with soil moisture level were not significant. In all four planting dates, once the larval tunneling ceased, i.e., pupation occurred, the effect on photosynthetic rate waned, even though the vascular obstruction (tunnel) was still present. The plants appeared to have some mechanism to compensate for the injury. These results suggest that European corn borer tunneling directly affected plant physiology, possibly through disturbing the source-sink relationship (upper photosynthesizing leaves-developing ear). Compared with adequately watered soils, water deficit conditions resulted in reduced photosynthetic rates, stomatal conductances, and intercellular CO<sub>2</sub> concentrations (1988 only), and in increased leaf temperatures; however, the effects were not transient as were the effects from the larval tunneling. Journal of economic entomology. Aug 1991. v. 84 (4). p. 1370-1380. Includes references. (NAL Call No.: DNAL 421 J822).

0413

**Effects of *Helminthosporium maydis* race T toxin on electron transport in susceptible corn mitochondria and prevention of toxin actions by dicyclohexylcarbodiimide.**

PLPFA. Holden, M.J. Sze, H. Rockville, Md. : American Society of Plant Physiologists. The effect of *Helminthosporium maydis* race T toxin on electron transport in susceptible cytoplasmic male-sterile Texas corn (*Zea mays* L.) mitochondria was investigated, using dichlorophenol indophenol and ferricyanide as electron acceptors. Succinate-dependent electron transport was stimulated by the toxin, consistent with the well described increase in membrane permeability induced by the toxin. Malate-dependent electron transport was inhibited. This inhibition of electron transport increased as a function of time of exposure to the toxin. Mitochondria from normal-fertile (N) corn were not affected by

the toxin. Both the inhibition of electron transport and the increase in ion permeability, such as dissipation of membrane potential and Ca<sup>2+</sup>, gradients, induced by the toxin in T corn was prevented by N,N'-dicyclohexylcarbodiimide, a hydrophobic carbodiimide. A water-soluble carbodiimide,

1-ethyl-3-(3-dimethylaminopropyl)-carbodiimide, was ineffective in preventing dissipation of membrane potential by the toxin. These results suggest that the various toxin actions are mediated via interaction of the toxin with one target site, most probably a 13 kilodalton polypeptide unique to T mitochondria. N,N'-dicyclohexylcarbodiimide may confer protection by modifying an amino acid residue in a hydrophobic portion of the target site. Plant physiology. Dec 1989. v. 91 (4). p. 1296-1302. Includes references. (NAL Call No.: DNAL 450 P692).

0414

**Effects of lime rate on corn root characteristics under enhanced ammonium supply.**  
JPNUDS. Ogango, K.O. Teyker, R.H. New York, N.Y. : Marcel Dekker. Plant growth under enhanced ammonium supply (EAS) can benefit from control of root-media acidification. Corn (B37XB79) was grown in a greenhouse in 18.9-L pots containing Bloomfield fine sand (coarse-loamy, mixed, mesic, Psammentic Hapludalf) with an initial pH of 5.4. Soil pH was adjusted using either CaCO<sub>3</sub> or Ca(OH)<sub>2</sub> to provide pH increments up to pH 7.4. Nitrogen (100 mg/kg) was added as (NH<sub>4</sub>)<sub>2</sub>SO<sub>4</sub>. A nitrification inhibitor was added to minimize oxidation of the NH<sub>4</sub>. Dry weights and Kjeldahl N were determined on leaves, stalks, tillers, and roots of 38 d plants. Acidity was measured from rhizosphere (pH<sub>r</sub>) and bulk (pH<sub>b</sub>) soil samples. Roots were sub-sampled for length and tissue NH<sub>4</sub> determinations. Corn growth at 38 d was not significantly affected by lime amendments. Liming with either form promoted a longer, finer root system. Root tissue NH<sub>4</sub> concentration decreased as rhizosphere pH increased for both lime forms up to a rhizosphere pH of 6.9. Rhizosphere acidification, the difference between pH<sub>r</sub> and pH<sub>b</sub>, decreased with lime rate, especially for the CaCO<sub>3</sub> form. Effects on root parameters were generally associated with pH differences and not with lime form. Journal of plant nutrition. 1991. v. 14 (2). p. 663-673. Includes references. (NAL Call No.: DNAL QK867.J67).

0415

**Effects of pH and aluminum and manganese toxicity on mycorrhizal associations with sorghum and maize /by Carlos Alberto Barbosa Medeiros.**

Medeiros, Carlos Alberto Barbosa. 1991. Thesis (Ph.D.)--University of Nebraska--Lincoln, 1991. xii, 230 leaves : ill. ; 28 cm. Includes bibliographical references. (NAL Call No.: NBU LD3656.5 1991 M434).

## (PLANT PHYSIOLOGY AND BIOCHEMISTRY)

0416

### European corn borer resistance and cell wall composition of three maize populations.

CRPSAY. Buendgen, M.R. Coors, J.G.; Grombacher, A.W.; Russell, W.A. Madison, Wis. : Crop Science Society of America. Feeding activities of herbivorous insects are influenced by host plant nutritional quality. Improved insect resistance resulting from either natural or artificial selection may be due, in part, to changes in nutritive constituents of plants. The first objective of this study was to measure changes in detergent fiber, lignin, ash, and N concentrations in whorls, leaf-sheaths, and stalks of the BS9 maize (*Zea mays L.*) population across five cycles of selection for resistance to the European corn borer (ECB) *Ostrinia nubilalis* (Hubner). The second objective was to evaluate ECB resistance in the WFISIHI and WFISILO maize populations, which were developed for high and low concentrations, respectively, of indigestible plant constituents (acid detergent fiber, lignin, and silica) in the leaf sheath. Leaf-sheath composition for all five cycles of BS9 was measured in three environments in Iowa. Whorl, leaf-sheath and stalk composition, as well as first- and second-generation ECB resistance of populations WFISIHI, WFISILO and Cycles 0, 2, 4, and 5 of BS9 were evaluated in two environments in Wisconsin. Whorl composition was not related to changes in ECB resistance in any population. In BS9, leaf-sheath and stalk concentrations of neutral and acid detergent fiber, cellulose, and lignin increased linearly over selection cycles. In contrast, WFISIHI was as susceptible to second-generation ECB as WFISILO, suggesting that the responses in BS9 may be due to linkage or unintentional selection. Populations BS9, WFISIHI, and WFISILO, however, were derived from diverse sources, and it is likely that mechanisms for resistance differ for the three populations. Crop science. May/June 1990. v. 30 (3). p. 505-510. Includes references. (NAL Call No.: DNAL 64.8 C883).

0417

Fungal toxins bind to the URF-13 protein in maize mitochondria and *Escherichia coli*. Braun, C.J. Siedow, J.N.; Levings, C.S. III. Rockville, Md. : American Society of Plant Physiologists. Expression of the maize mitochondrial T-urf13 gene results in a sensitivity to a family of fungal pathotoxins and to methomyl, a structurally unrelated systemic insecticide. Similar effects of pathotoxins and methomyl are observed when T-urf13 is cloned and expressed in *Escherichia coli*. An interaction between these compounds and the membrane-bound URF13 protein permeabilizes the inner mitochondrial and bacterial plasma membranes. To understand the toxin-URF13 effects, we have investigated whether toxin specifically binds to the URF13 protein. Our studies indicate that toxin binds to the URF13 protein in maize mitochondria and in *E. coli* expressing URF13. Binding analysis in *E. coli* reveals cooperative toxin binding. A low level of specific toxin binding is also

demonstrated in cms-T and cms-T-restored mitochondria; however, binding does not appear to be cooperative in maize mitochondria. Competition and displacement studies in *E. coli* demonstrate that toxin binding is reversible and that the toxins and methomyl compete for the same, or for overlapping, binding sites. Two toxin-insensitive URF13 mutants display a diminished capability to bind toxin in *E. coli*, which identifies residues of URF13 important in toxin binding. A third toxin-insensitive URF13 mutant shows considerable toxin binding in *E. coli*, demonstrating that toxin binding can occur without causing membrane permeabilization. Our results indicate that toxin-mediated membrane permeabilization only occurs when toxin or methomyl is bound to URF13. The Plant cell. Feb 1990. v. 2 (2). p. 153-161. Includes references. (NAL Call No.: DNAL QK725.P532).

0418

### Herbicides that inhibit acetohydroxyacid synthase.

WEESA6. Stidham, M.A. Champaign, Ill. : Weed Science Society of America. Acetohydroxyacid synthase was discovered as the site of action of imidazolinone and sulfonylurea herbicides over 6 yr ago. In recent years, advances have been made in the understanding of this enzyme as a herbicide target site. Derivatives of both imidazolinones and sulfonylureas have yielded new herbicide chemistry. All of the herbicides display unusual "slow-binding" behavior with the enzyme, and this behavior may help explain efficacy of the herbicides. Resistance to these herbicides has been developed through a number of different procedures, and the mechanism of resistance is through changes in sensitivity of the enzyme to the herbicides. The changes are either selective to only one class of chemistry, or broad to a number of classes of chemistry. These data support the idea that binding sites for the herbicides on the enzyme are only partially overlapping. Progress in purification of AHAS from corn includes discovery of the existence of the enzyme in monomer and oligomer aggregation states. The interaction of the enzyme with the herbicides is affected by enzyme aggregation state. Weed science. Paper presented at the "Symposium on Herbicide Mechanism of Action," February 7, 1990, Montreal, Canada. July/Sept 1991. v. 39 (3). p. 428-434. Includes references. (NAL Call No.: DNAL 79.8 W41).

0419

### High temperature stress-induced severity of disease in maize may involve solubilization of proteins.

Akhtar, M. Garraway, M.O. Columbia, Mo. : The Interdisciplinary Plant Biochemistry and Physiology Program. Current topics in plant biochemistry and physiology : Proceedings of the ... Plant Biochemistry and Physiology Symposium held at the University of Missouri, Columbia. 1989. v. 8. p. 280. Includes references. (NAL Call No.: DNAL QK861.P55).

## (PLANT PHYSIOLOGY AND BIOCHEMISTRY)

0420

### Identification of genes governing filamentous growth and tumor induction by the plant pathogen *Ustilago maydis*.

PNASA. Banuett, F. Washington, D.C. : The Academy. Two master regulatory loci, a and b, govern life-cycle transitions of the phytopathogenic fungus *Ustilago maydis*. Fusion of haploids that differ at both a and b results in production of a filamentous dikaryon, which induces tumors in its host, maize. Here I describe identification of genes distinct from a and b that play roles in these life-cycle transitions. These studies identify three genes, fuz1, fuz2, and rtf1, that are necessary for filament formation. fuz1 is also necessary for normal size and distribution of tumors and for teliospore formation; fuz2 is also necessary for teliospore germination. Mutations in the rtf1 gene, which are recessive, bypass the requirement of different b alleles for tumor formation. This observation indicates that rtf1 codes for a negative regulator of tumor induction. The fuz1, fuz2, and rtf1 genes may be targets for the a and b loci.

Proceedings of the National Academy of Sciences of the United States of America. May 1, 1991. v. 88 (9). p. 3922-3926. Includes references. (NAL Call No.: DNAL 500 N21P).

0421

### Imidazolinone-induced loss of acetohydroxyacid synthase activity in maize is not due to the enzyme degradation.

PLPHA. Shaner, D.L. Singh, B.K. Rockville, Md. : American Society of Plant Physiologists. Acetohydroxyacid synthase (AHAS), the first enzyme leading to the biosynthesis of valine, leucine, and isoleucine, is inhibited by different chemical classes of herbicides. There is a loss in the extractable AHAS activity in imidazolinone-treated plants. Immunological studies using a monoclonal antibody against AHAS revealed no degradation of AHAS protein in imidazolinone-treated maize (*Zea mays*) plants. Therefore, the loss in AHAS activity is not due to the loss of AHAS protein. Plant physiology. Dec 1991. v. 97 (4). p. 1339-1341. Includes references. (NAL Call No.: DNAL 450 P692).

0422

### Induction of nitrate transport in maize roots, and kinetics of influx, measured with nitrogen-13.

PLPHA. Hole, D.J. Emran, A.M.; Fares, Y.; Drew, M.C. Rockville, Md. : American Society of Plant Physiologists. Unlike phosphate or potassium transport, uptake of nitrate by roots is induced, in part, by contact with the substrate ion. Plasmalemma influx <sup>13</sup>N-labeled nitrate in maize roots was studied in relation to induction of the uptake system, and the influence of short-term N starvation. Maize (*Zea mays*) roots not previously exposed to nitrate had a constitutive transport system (state 1), but influx increased 250% during six hours of contact with 100 micromolar nitrate,

by which time the transport mechanism appeared to be fully synthesized (state 2). A three-day period of N starvation prior to induction and measurement of nitrate influx resulted in a greater capacity to transport nitrate than in unstarved controls, but this was fully expressed only if roots were kept in contact with nitrate for the six hours needed for full induction (state 2E). A kinetic analysis indicated a 160% increase in maximum influx in N-starved, induced roots with a small decrease in Km. The inducible component to nitrate influx was induced only by contact with nitrate. Full expression of the nitrate inducible transport system was dependent upon mRNA synthesis. An inhibitor of cytoplasmic protein synthesis (cycloheximide) eliminated the formation of the transport system while inhibition by chloramphenicol of mitochondrial- or plastid-coded protein synthesis had no effect. Poisoning of membrane-bound proteins effectively disabled both the constitutive and induced transport systems. Plant physiology. June 1990. v. 93 (2). p. 642-647. Includes references. (NAL Call No.: DNAL 450 P692).

0423

### Inhibition of auxin transport by isoquinolinedione herbicides.

JPGRDI. Gardner, G. Semple, J.E. New York, N.Y. : Springer. Journal of plant growth regulation. Summer 1990. v. 9 (3). p. 161-169. Includes references. (NAL Call No.: DNAL QK745.J6).

0424

### Inhibition of chloroplast-mediated reactions by quizalofop herbicide.

WEESA6. Ruizzo, M.A. Gorski, S.F. Champaign, Ill. : Weed Science Society of America. A mechanism of action of the ethyl ester of quizalofop was determined in monocotyledonous and dicotyledonous plants. Quizalofop inhibited electron transport in both cucumber and corn chloroplasts. In corn, inhibition of electron transport was more pronounced under phosphorylating conditions. Half-maximal inhibition (I<sub>50</sub>) of ATP synthesis was achieved with a 75-microM concentration of quizalofop in coupled corn chloroplasts. Cucumber chloroplast ATP synthesis was not inhibited at herbicide concentrations up to 100 microM. Corn chloroplast fractions contained greater quantities of bound <sup>14</sup>C quizalofop ester following incubation in light and dark assays. Thin-layer radiochromatograms of <sup>14</sup>C-labeled quizalofop showed no metabolism or degradation of parent ester incubated in light and dark chloroplast-mediated reactions. In our studies, it is apparent that the inhibitory action of quizalofop was due to the parent ester. The ester formulation of quizalofop appears to exhibit multiple activity in susceptible plant chloroplasts. Weed science. Nov 1988. v. 36 (6). p. 713-718. Includes references. (NAL Call No.: DNAL 79.8 W41).

## (PLANT PHYSIOLOGY AND BIOCHEMISTRY)

0425

**Inhibition of corn callus growth by *Helminthosporium carbonum* Race 1 toxin.**  
CRPSAY. Wolf, S.J. Earle, E.D. Madison, Wis. : Crop Science Society of America. Plant tissue culture has potential application in the development of disease-resistant crops and also in the study of host-pathogen interactions in vitro. Pathogen-produced toxins (phytotoxins) can be used as pathogen surrogates in such work. *Helminthosporium carbonum* Race 1, the causal agent for *Helminthosporium* leaf spot of corn (*Zea mays* L.), produces a phytotoxin (HC toxin) known to be the pathogenicity factor for that disease. Tissue cultures were established from corn genotypes susceptible or resistant to *H. carbonum* Race 1. A toxin preparation with an effective dose (ED50) of 2 micrograms mL<sup>-1</sup> for seedling roots was incorporated into callus growth and regeneration media. Growth of callus derived from genotypes susceptible to the pathogen was inhibited at 5 micrograms mL<sup>-1</sup> toxin, whereas callus from a resistant genotype was inhibited only at 50 micrograms mL<sup>-1</sup> toxin. Regeneration of plants from callus of susceptible genotypes was also inhibited at 5 micrograms mL<sup>-1</sup> toxin, but regeneration of a resistant genotype was not inhibited at 20 micrograms mL<sup>-1</sup> toxin. A total of 5676 calli from the susceptible lines were exposed to toxin concentrations of 2, 5, and 10 micrograms mL<sup>-1</sup>. Both 3 and 15-mo old calli were used. Some cultures were treated with the mutagens sodium azide and ethyl methane sulfonate before exposure to toxin. No resistant callus or plants were recovered from any of the treatments. Failure to recover resistant callus might be due to an inability to identify resistant cells within a relatively slow-growing callus population. Crop science. May/June 1990. v. 30 (3). p. 728-734. Includes references. (NAL Call No.: DNAL 64.8 C883).

0426

**Interference of four annual weeds in corn (*Zea mays*).**  
WEESA6. Beckett, T.H. Stoller, E.W.; Wax, L.M. Champaign, Ill. : Weed Science Society of America. Season-long interference of shattercane, giant foxtail, common cocklebur, and common lambsquarters in corn was evaluated in the field at weed densities from 0.4 to 13.1 plants or clumps/m of corn row during 1985, 1986, and 1987. Corn seed yields decreased linearly with increases in the density of clumps of 2 to 3 shattercane plants and 5 to 8 giant foxtail plants, reaching 22% yield loss at 6.6 shattercane clumps/m of row and 18% yield loss at 13.1 giant foxtail clumps/m of row. Increases in common cocklebur density caused corn yields to decrease curvilinearly in 1985 with a maximum predicted yield loss of 27% occurring at a density of 4.7 common cocklebur plants/m of row. In 1986 and 1987, yields decreased linearly as common cocklebur density increased to 6.6 plants/m of row, where a 10% yield loss was observed. Common lambsquarters reduced corn yields only in 1985. In this year, yields decreased curvilinearly with increasing weed density, resulting in a maximum yield loss

of 12% at 4.9 common lambsquarters plants/m of row. Corn yields averaged 11600 kg/ha when grown without weed interference in these experiments. Weed science. Nov 1988. v. 36 (6). p. 764-769. Includes references. (NAL Call No.: DNAL 79.8 W41).

0427

**Irrigation and nitrogen management effects on corn reproduction.**

AAEPC. Jennings, G.D. Martin, D.L.; Schepers, J.S. St. Joseph, Mich. : The Society. Paper - American Society of Agricultural Engineers. Paper presented at the 1989 International Meeting, December 12-15, 1989, New Orleans, Louisiana. Winter 1989. (89-2692). 29 p. Includes references. (NAL Call No.: DNAL 290.9 AM32P).

0428

**Maize-silk maysin data: comparison of interpretations of quantifications by spectrophotometry and HPLC.**

JAFCAU. Widstrom, N.W. Snook, M.E.; McMillan, W.W.; Waiss, A.C. Jr.; Elliger, C.A. Washington, D.C. : American Chemical Society. Maysin in maize silks is antibiotic to the corn earworm. Our objective was to compare spectrophotometric and reversed-phase HPLC methods of quantifying maysin concentrations. HPLC assay has eliminated abnormally high readings obtained when the spectrophotometric method was used. Maysin of three maize populations, and parents and related generations of two hybrids, was analyzed by both methods and compared. Spectrophotometrically analyzed maysin concentrations of individual silks were similar, but variances differed from those analyzed by HPLC. Spectrophotometric values were scattered for SC235XF44 and its related populations in 1983, but 1988 HPLC determinations produced interpretable data. Data from F6XF44 populations in 1983 suggested that F6 has a gene for reducing maysin content, but 1988 HPLC distributions indicated that the gene in F6 is dominant for low maysin content. The changes in interpretation illustrate the importance of using an accurate method for measuring silk maysin concentration. Journal of agricultural and food chemistry. Jan 1991. v. 39 (1). p. 182-184. Includes references. (NAL Call No.: DNAL 381 J8223).

0429

**Mechanism of clomazone selectivity in corn (*Zea mays*), soybean (*Glycine max*), smooth pigweed (*Amaranthus hybridus*), and velvetleaf (*Abutilon theophrasti*).**

WEESA6. Liebl, R.A. Norman, M.A. Champaign, Ill. : Weed Science Society of America. Based on chlorophyll content, hydroponically cultured soybean seedlings were 254, 66, and 13 times more tolerant to clomazone than velvetleaf, corn, and smooth pigweed, respectively.

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Clomazone, at concentrations that inhibited chlorophyll, did not affect fresh weight accumulations of any species except velvetleaf. However, in velvetleaf, fresh weight accumulation was only half as sensitive to clomazone as the leaf chlorophyll content. Uptake of <sup>14</sup>C-clomazone from nutrient solution by 72 h after treatment (HAT) (pigweed > velvetleaf > soybean > corn) indicates that differential absorption cannot account for selectivity. Shoot:root ratios of <sup>14</sup>C recovered from soybean, corn, velvetleaf, and pigweed by 72 HAT were 0.39, 0.84, 1.67, and 2.37, respectively. The limited acropetal clomazone translocation in soybean seedlings may account to a small degree for soybean tolerance to clomazone. Conversion of clomazone to more polar metabolites was rapid in all four species. There were no significant differences among species in the percentage of <sup>14</sup>C activity recovered as clomazone from root tissue by 72 HAT. Of the <sup>14</sup>C activity recovered from shoots of soybean, corn, pigweed, and velvetleaf seedlings by 72 HAT, 46, 59, 35, and 54%, respectively, was clomazone. Differences in clomazone uptake, distribution, and metabolism among the four species were either insignificant or poorly correlated to selectivity, and therefore cannot account for the tremendous differences in clomazone sensitivity among these species. These observations indicate, indirectly, that differences at the site of action may account for selectivity. *Weed science*. July/Sept 1991. v. 39 (3). p. 329-332. Includes references. (NAL Call No.: DNAL 79.8 W41).

0430

**Morphological responses of crop and weed species of different growth forms to ultraviolet-B radiation.**  
AJBOAA. Barnes, P.W. Flint, S.D.; Caldwell, M.M. Columbus, Ohio : Botanical Society of America. *American journal of botany*. Oct 1990. v. 77 (10). p. 1354-1360. Includes references. (NAL Call No.: DNAL 450 AM36).

0431

**A new family of plant antifungal proteins.**  
MPMIEL. Vigers, A.J. Roberts, W.K.; Selitrennikoff, C.P. St. Paul, Minn. : APS Press. *Molecular plant-microbe interactions* : MPMI. July/Aug 1991. v. 4 (4). p. 315-323. Includes references. (NAL Call No.: DNAL SB732.6.M65).

0432

**Nitrogen management and nitrification inhibitor effects on nitrogen-15 urea. I. Yield and fertilizer use efficiency.**  
SSJD4. Walters, D.T. Malzer, G.L. Madison, Wis. : The Society. Nitrification inhibitors (NI) are sometimes recommended for use with ammoniacal fertilizers in corn (*Zea mays L.*) production to improve fertilizer N use

efficiency (FUE). The objectives of this experiment were to evaluate the effects of the NI nitrapyrin 2-chloro-6-(trichloromethyl) pyridine application on yield and FUE of irrigated corn, and to monitor the fate of a single application of <sup>15</sup>N-enriched urea during a multiyear period in both soil and plant. Treatments included a factorial combination of two N rates (90 or 180 kg urea-N ha<sup>-1</sup> yr<sup>-1</sup>) applied during a 3-yr period, with or without a NI and with or without incorporation, plus a zero-N control. Twenty-seven nonweighing lysimeters were used to quantify leaching load. Treatment effects on yield and FUE differed each year due to interactions of climate and N-management variables. Nonincorporated urea + NI reduced grain yield when leaching load was low and increased yield at the 90 kg ha<sup>-1</sup> N rate when leaching load was high. Maximum FUE occurred at the 90 kg ha<sup>-1</sup> N rate when leaching load was low. The NI increased FUE only at the 90 kg ha<sup>-1</sup> N rate when leaching load was high. Incorporation of urea + NI reduced plant recovery of fertilizer-derived N (FDN) in the year of application, but resulted in increased uptake of residual FDN in subsequent years. Incorporation of NI with moderate N rates coupled with conservative irrigation management should reduce the risk of yield loss and minimize NO<sub>3</sub> movement to groundwater. *Soil Science Society of America journal*. Jan/Feb 1990. v. 54 (1). p. 115-122. Includes references. (NAL Call No.: DNAL 56.9 S03).

0433

**Nitrogen management and nitrification inhibitor effects on nitrogen-15 urea. II. Nitrogen leaching and balance.**  
SSJD4. Walters, D.T. Malzer, G.L. Madison, Wis. : The Society. Nitrification inhibitors (NI) may reduce N leaching losses, and should have the greatest effect on sandy soils where leaching potential is high. This study used 27 lysimeters to evaluate the effect of a NI, nitrapyrin 2-chloro-6-(trichloromethyl) pyridine, on soil water percolation (SWP) and N leaching losses from an irrigated sandy loam soil (Typic Hapludoll) planted with corn (*Zea mays L.*), and monitor the fate of a single application of <sup>15</sup>N-enriched urea over a multiyear period. Urea was applied at 90 and 180 kg N ha<sup>-1</sup> yr<sup>-1</sup> for a 3-yr period, with and without NI, and with and without incorporation. Urea + NI reduced SWP between planting and silking in 2 out of 3 yr when growing degree days (GDD) were high. After silking, SWP was reduced when urea + NI was incorporated and leaching load was high. A twofold increase in N rate resulted in an average of 3.4 times more N leached over 3 yr. The NI influenced time of N loss but not total N loss. Leaching losses of fertilizer-derived N (FDN) were delayed 25 to 50 d when urea + NI were incorporated. The leaching load required to reach the maximum rate of FDN loss was higher with urea + NI. Leaching losses of fertilizer N were three times greater when determined by the difference method than by isotope-ratio analysis. Differing results with these two calculations are attributed to isotope dilution with indigenous soil N as a result of microbial

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activity. Nitrification inhibitors may reduce the potential for nonpoint-source pollution by delaying NO<sub>3</sub> leaching, but will be most effective if coupled with proper N rates and conservative irrigation water management. Soil Science Society of America journal. Jan/Feb 1990. v. 54 (1). p. 122-130. Includes references. (NAL Call No.: DNAL 56.9 S03).

0434

**Peritheciun production in Fusarium graminearum populations and lack of correlation with zearalenone production.**

MYCOAE. Windels, C.E. Mirocha, C.J.; Abbas, H.K.; Xie, W. Bronx, N.Y. : The New York Botanical Garden. Mycologia. Mar/Apr 1989. v. 81 (2). p. 272-277. Includes references. (NAL Call No.: DNAL 450 M99).

0435

**Phosphorus behavior in flooded-drained soils.**

**III. Phosphorus desorption and availability.** SSSJD4. Sah, R.N. Mikkelsen, D.S.; Hafez, A.A. Madison, Wis. : The Society. Four California soils that showed wide variability in soil properties and P sorptivity under flooded-drained (FD) conditions were selected for this study. The soils were flooded for 0 to 90 d at two levels of organic matter (0M, 0 and 10 g kg<sup>-1</sup>) and two temperatures (23 and 35 degrees C). They were subsequently drained and used for P-sorption studies at 0.3, 1.2, and 2.0 mM initial P concentrations. The P desorption from P-sorbed soils were carried out in three consecutive extractions with 0.1 M NaCl. The effect of FD conditions on P availability to corn (*Zea mays L.*), was studied at three levels of P (0, 5, and 20 mg P kg<sup>-1</sup> soil). Without OM treatment, FD conditions decreased P desorption in three of four soils examined. Added OM and higher temperature further decreased P desorption and the period of flooding (FP) required to reach the minimum P desorption. Organic matter markedly decreased P desorption even in Soil 3, which was unaffected by FD conditions. Under FD conditions, plant-tissue P concentration of corn was decreased to a variable extent depending on soil type. The desorption of added fertilizer P in a given FD soil correlated well with changes in the amorphous FeA fraction under comparable conditions. Phosphorus sorption and desorption were controlled by the changes in amorphous FeA and, in some cases, amorphous FeB fractions. Soil Science Society of America journal. Nov/Dec 1989. v. 53 (6). p. 1729-1732. Includes references. (NAL Call No.: DNAL 56.9 S03).

0436

**Reexamination of the acid-growth theory of auxin action.**

PLPRA. Luthen, H. Bigdon, M.; Bottger, M. Rockville, Md. : American Society of Plant Physiologists. Some crucial arguments against the acid growth theory of auxin action (U Kutschera, P Schopfer 1985 *Planta* 163: 483-493) have been reinvestigated by simultaneous measurements of proton fluxes and growth of maize (*Zea mays L.*) coleoptiles. Special care was taken to obtain a mild, effective and reproducible abrasion of the cuticle. Proton secretion rates were determined in a computer-controlled pH-stat. In some experiments, equilibrium pH was measured. Growth rates were determined simultaneously in the same vessel using a transducer-type auxanometer. It was found that (a) the timing of auxin and fusicoccin-induced (FC) proton secretion and growth matches well, (b) the equilibrium external pHs in the presence of IAA and FC are lower than previously recorded and below the so-called 'threshold-pH,' (c) neutral or alkaline unbuffered solutions partially inhibit FC and IAA-induced growth in a similar manner, (d) the action of pH, FC, and IAA on growth are not additive. It is concluded that the acid-growth-theory correctly describes incidents taking place in the early phases of auxin-induced growth. Plant physiology. July 1990. v. 93 (3). p. 931-939. i11. Includes references. (NAL Call No.: DNAL 450 P692).

0437

**Relationship between simulated Chinese rose beetle (Coleoptera: Scarabaeidae) feeding and photosynthetic rate reduction.**

PHESA. Furutani, S.C. Arita, L.H.; Fuji, J.K. Honolulu, Hawaii : The Society. Proceedings of the Hawaiian Entomological Society. Dec 31, 1990. v. 30. p. 97-104. Includes references. (NAL Call No.: DNAL 420 H312).

0438

**Relationships between laboratory germination tests and field emergence of maize inbreds.**

CRPSAY. Martin, B.A. Smith, O.S.; O'Neil, M. Madison, Wis. : Crop Science Society of America. In the USA and Europe maize (*Zea mays L.*) is often planted into soils that are or become cold and wet resulting in reduced field emergence, poor stands, and lower economic yields. This study was conducted to determine the relative merits of two germination tests, the cold and soak tests, for prediction of field emergence when soil temperatures are suboptimal for germination. The effects of initial seed moisture on field emergence were also investigated. Field emergence of 48 maize inbred lines was measured in eight locations in 1986 and 1987. The seeds of each inbred were also cold and soak tested. Seeds taken directly from conditioned storage and seeds dried to 80 g kg<sup>-1</sup> moisture were used in these studies. In 1986, the cold and soak test were equally correlated with field emergence  $r = 0.43$ .

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(significant at the 0.01 level of probability) and 0.40 respectively. In 1987, the cold test was more highly correlated with field emergence ( $r = 0.74$ ) than the soak test ( $r = 0.43$ ). These correlations between laboratory germination tests and field emergence were affected by both location and year. Drying seeds to 80 g kg<sup>-1</sup> moisture resulted in an overall 5% decrease in field emergence in both years. There was a significant inbred line-by-year interaction, but only one inbred was significantly affected in both years. The value of these germination tests as a tool to aid selection was also investigated and both tests were equally accurate (60% agreement) at predicting those inbreds with field emergence in the lower 30% in both years. The soak test may be considered a rapid, inexpensive, and effective selection tool for elimination of those inbreds with poor field emergence, however, the cold test was superior for prediction of the field emergence of a wide range of inbred lines in a number of environments. Crop science. Sept/Oct 1988. v. 28 (5). p. 801-805. Includes references. (NAL Call No.: DNAL 64.8 C883).

0439

### Reproduction on *Meloidogyne incognita* on open-pollinated maize varieties.

JONEB. Aung, T. Windham, G.L.; Williams, W.P. Lake Alfred, Fla. : Society of Nematologists. Journal of nematology. Supplement to the Journal of Nematology (Annals of Applied Nematology). Oct 1990. v. 22 (4S). p. 651-653. Includes references. (NAL Call No.: DNAL QL391.N4J62).

0440

**Residual effects of nitrogen fertilization and winter cover cropping on nitrogen availability.** SSSJD4. McCracken, D.V. Corak, S.J.; Smith, M.S.; Frye, W.W.; Blevins, R.L. Madison, Wis. : The Society. Long-term management practices affect the reserve of mineralizable soil N, and so can influence the amount of supplemental N fertilizer required in crop production. This study was conducted to (i) evaluate the residual effects of long-term N fertilization and winter cover cropping on corn (*Zea mays L.*) N nutrition, and (ii) examine the ability of selected soil indices to detect management-induced differences in soil N availability. In 1986, N fertilizer and winter cover crops were eliminated from plots which, from 1976 through 1985, had received varying tillage treatments, N fertilizer additions, and either hairy vetch (*Vicia villosa* Roth), rye (*Secale cereale L.*), or no winter cover crop. A history of N fertilization increased corn yield and N uptake (by an average of 20.4 kg N/ha). A history of winter cover cropping with hairy vetch increased corn yield and N uptake (by an average of 28.0 kg N/ha). Rye cover cropping generally had small or inconsistent effects relative to no cover crop. Tillage generally had insignificant effects on corn yield and N uptake. Soil N availability indices were

determined on surface samples (0-15 cm) taken 2 wk after corn planting. The anaerobic incubation provided a poor index of N availability. Total soil C and Kjeldahl N were affected by tillage, though not by cover crop or fertilization history, and were marginally correlated with crop response. The autoclave index was only slightly superior to total soil C and Kjeldahl N as a N-availability index. The soil NO<sub>3</sub>-N concentration was highly correlated with corn yield, and N uptake. Though this study was conducted for 1 yr at one site, results indicate that measurement of surface soil NO<sub>3</sub>-N made shortly after corn planting can provide a valid index of the effects of past crop and soil management practices on soil N availability to corn. Soil Science Society of America journal. Sept/Oct 1989. v. 53 (5). p. 1459-1464. Includes references. (NAL Call No.: DNAL 56.9 S03).

0441

### Response of ammonium assimilation enzymes to nitrogen form treatments in different plant species.

JPNUDS. Magalhaes, J.R. Huber, D.M. New York, N.Y. : Marcel Dekker. This series of experiments studied N metabolism in tomato, rice and corn. Ammonium (NH<sub>4</sub><sup>+</sup>), as a sole source of N, reduced tomato and corn growth, but not rice growth. Tomato showed the most severe NH<sub>4</sub><sup>+</sup> toxicity. Ammonium assimilation enzyme activity differed greatly among the species. Rice had much higher glutamine synthetase (GS) activity than corn and tomato with NH<sub>4</sub><sup>+</sup> nutrition. GS activity was especially high in shoot tissue. Ammonium induced high activity of glutamate dehydrogenase (GDH) in roots of tomato but not in rice. GS activity in rice increased as the level of NH<sub>4</sub><sup>+</sup> increased; and it was higher in shoots than roots, indicating GS activity as a key factor in the detoxification and metabolism of NH<sub>4</sub><sup>+</sup> in green tissues of efficient plant species. Journal of plant nutrition. 1991. v. 14 (2). p. 175-185. Includes references. (NAL Call No.: DNAL QK867.J67).

0442

### Response of irrigated corn to sulfur fertilization in the Atlantic Coastal Plain.

SSSJD4. Kline, J.S. Sims, J.T.; Schilke-Gartley, K.L. Madison, Wis. : The Society. Accurate prediction of yield response by corn (*Zea mays L.*) to S fertilization on the coarse-textured soils of the Atlantic Coastal Plain requires information on availability and persistence of subsoil SO<sub>4</sub>-S, potentially mineralizable soil S, and S added in irrigation and precipitation. A 3-yr study was conducted with irrigated corn on four soils possessing characteristics commonly associated with S deficiency. A factorial combination of S application rate (0, 33, 67, 101 kg ha<sup>-1</sup>) and method (single broadcast at planting, split) was used. Grain yield, and S concentrations and N/S ratios of early whole plants (EWP) and ear leaves (EL) were determined. Extractable SO<sub>4</sub>-S

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(0-100 cm) levels and inputs from irrigation and precipitation were measured in each year; mineralizable S in A<sub>1</sub> horizons of all soils was determined by two incubation methods (leached and nonleached). Although application of S generally increased plant S concentrations, significant yield increases occurred in only three of the 12 site-year combinations. Critical values for S and N/S, based on combined data from responsive sites, were 2.1 and 1.6 g S kg<sup>-1</sup> and 18.7 and 20.3, for EWP and EL, respectively. Lack of yield response was attributed to subsoil SO<sub>4</sub>-S, (average, 0-100 cm = 170 kg S ha<sup>-1</sup>, mineralizable S (average = 80 kg ha<sup>-1</sup>, leached method) and S contained in irrigation or precipitation (annual average = 7.5 kg ha<sup>-1</sup>). Yield increases obtained at the most responsive site may have been caused by increased immobilization of S, due to no-tillage management, the presence of a physical barrier to root penetration at 40 to 60 cm, or subsoil A<sub>1</sub>. Successful prediction of corn response to S fertilization in Coastal Plain soils will require a comprehensive program that combines subsoil sampling and selective plant analysis, concentrated on sites identified as potentially responsive based on soil properties. Soil Science Society of America journal. July/Aug 1989. v. 53 (4). p. 1101-1108. Includes references. (NAL Call No.: DNAL 56.9 S03).

### 0443

**Response of western corn rootworm-infested corn to nitrogen fertilization and plant density.** CRPSAY. Spike, B.P. Tollefson, J.J. Madison, Wis. : Crop Science Society of America. Growth response of corn (*Zea mays L.*) to corn rootworm (*Diabrotica* spp.) infestation is poorly understood and may be influenced by management practices and environmental conditions. The objectives of this 2-yr experiment were to determine the effect of three N rates (0, 168, and 336 kg ha<sup>-1</sup>) and three plant density treatments (39 000 1984 only, 63 000, and 87 000 plants ha<sup>-1</sup> on dry-matter accumulation and partitioning of corn plants infested with three levels of western corn rootworm (WCR, *Diabrotica virgifera* LeConte) 0, 1967, and 3934 eggs m<sup>-1</sup> row. Plant dry weight taken periodically and subdivided into vegetative and reproductive fractions, was used to calculate the harvest index and mean relative growth rates (R<sub>t</sub>). In 1985, leaf area was measured and leaf area index (LAI), mean net assimilation rate (NAR), and leaf area ratio (LAR) were calculated. In 1985, a dry year, rootworm-injured plants had significantly reduced dry weight, leaf area, harvest index, R<sub>t</sub>, and NAR. Dry-matter accumulation of injured plants was greater in low plant-density and applied-N treatments. In comparison with parameters of healthy plants, dry weight, R<sub>t</sub>, and NAR of injured plants were reduced in high-N treatments at the time of rootworm feeding. This significant rootworm X N interaction did not occur after feeding ceased. Rootworm infestation significantly reduced the harvest index only 1985, suggesting that dry conditions increase the impact of root injury on ear development and yields. Crop science.

May/June 1991. v. 31 (3). p. 776-785. Includes references. (NAL Call No.: DNAL 64.8 C883).

### 0444

#### **Shading effects on dry matter and nitrogen partitioning, kernel number, and yield of maize.**

CRPSAY. Reed, A.J. Singletary, G.W.; Schussler, J.R.; Williamson, D.R.; Christy, A.L. Madison, Wis. : Crop Science Society of America. Assimilate supply to the developing ear of maize (*Zea mays L.*) is an important determinant of grain yield. The objective of the current study was to determine the relative limitations of photosynthate and reduced N supply to the ear for determination of yield components, kernel number and kernel weight. Field-grown maize plants on Dupo silt loam (Coarse-silty over clayey, mixed, nonacid, mesic Aquic Udifluvents) were shaded during either vegetative growth, flowering, or grain fill. Control plants were not shaded. Photosynthesis was measured on plots from 9 d before flowering to grain maturity, and plants were sampled at intervals during this period for measurement of dry weight and reduced N content of plant parts of the aboveground vegetation (stover) and ear. When plants were shaded during flowering, photosynthesis decreased during this period and kernel abortion increased relative to controls. However, N concentration was higher in aborting kernels than in nonaborting kernels through late flowering and early grain fill. The supply of reduced N to the ear during flowering was not a limiting factor for determination of kernel number. During grain fill, remobilization of N and dry matter from the stover of controls accounted for 46.5 and 4.7% of ear N and dry weight at maturity, respectively. Availability of newly reduced N was apparently more limiting than availability of current photosynthate for kernel dry weight accumulation. It is proposed that supply of newly reduced N to the ear may be limited by the amount of photosynthate partitioned for nitrate uptake and reduction during grain fill. Crop science. Sept/Oct 1988. v. 28 (5). p. 819-825. Includes references. (NAL Call No.: DNAL 64.8 C883).

### 0445

#### **Short-term leaf elongation kinetics of maize in response to salinity are independent of the root.**

PLPNA. Cramer, G.R. Bowman, D.C. Rockville, Md. : American Society of Plant Physiologists. The essentiality of roots to the short-term responses of leaf elongation to salinity was tested by removing the roots of maize (*Zea mays L.*) from the shoots and comparing the initial short-term response of leaf elongation to that with intact plants. Eight-day-old seedlings growing in solution culture were treated with 80 millimolar NaCl and their leaf elongation rate (LER) was monitored with a linear variable differential transformer connected to a computerized data acquisition system. Initially, LER of intact plants was sharply reduced by

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salinity, then rose rapidly to reach a new steady-state rate about 1.5 hours after salinization. The new steady-state rate of salinized intact plants was about 80% of the control rate. When the roots of nonsalinized plants were excised under the surface of the nutrient solution, excision did not disturb the steady-state LER. When these shoots were salinized, they responded in a manner nearly identical to that of intact plants, indicating that roots are not essential for the modulation of short-term LER of salt-stressed plants. Plant physiology. Mar 1991. v. 95 (3). p. 965-967. Includes references. (NAL Call No.: DNAL 450 P692).

0448

### Sprinkler irrigation management for corn--Southern Great Plains.

Howell, T.A. Copeland, K.S.; Schneider, A.D.; Dusek, D.A. Washington, D.C. : The Service. Reprints - U.S. Department of Agriculture, Agricultural Research Service. Literature review. Jan/Feb 1989. 159 . p. 147-155. Includes references. (NAL Call No.: DNAL aS21.A8U5/ARS).

0447

### Temporal effects of subsoil compaction on soil strength and plant growth.

SSJD4. Lowery, B. Schuler, R.T. Madison, Wis. : The Society. In recent years, scientists have become concerned that heavy farm equipment is causing soil compaction below the nominal depth of tillage. Compaction this deep may not be ameliorated after one season's freeze-thaw and wet-dry cycles. Experiments were conducted on a Kewaunee (fine, mixed, mesic Typic Hapludalf) and Rozetta (fine-silty, mixed, mesic Typic Hapludalf) soil to determine the duration and effect of subsoil compaction on soil strength and corn (*Zea mays* L.) growth. Soil at two sites was compacted with 8 and 12.5 Mg axle loads in the spring of 1983. Cone-penetration resistance of compacted soil was significantly higher than that of uncompacted soil below the plow zone. Plant heights, at physiological maturity averaged across both sites, were reduced 13 and 26% on the 8- and 12.5-Mg compaction treatments, respectively, compared with the control in 1983. In 1984, average mature plant heights were 2.4, 2.3, and 2.3 m for the control 8-, and 12.5-Mg compaction, respectively. Three years after the compaction was applied (1986), the average mature plant height for the 8- and 12.5-Mg compacted sites were reduced 3.1 and 4.3% compared with the control. Nitrogen and K uptake was reduced by compaction. Iron, Al, and Mn uptake increased with increasing levels of compaction on the Kewaunee soil in 1983. In 1983, yields for the 8- and 12.5-Mg treatments on the Rozetta soil were reduced 4 and 14%, respectively, relative to the control. Similarly, yields for the Kewaunee soil were reduced 14 and 43%. Yields for the Kewaunee soil were not reduced by compaction in 1984, although 5 and 9% reductions were observed at the Rozetta site.

Yields were not affected the following 2 yr (1985 and 1986), whereas the resistance to cone penetration was significantly in the compacted plots compared with the control. Soil Science Society of America journal. Jan/Feb 1991. v. 55 (1). p. 216-223. Includes references. (NAL Call No.: DNAL 56.9 S03).

0448

### Translational alterations in maize leaves responding to pathogen infection, paraquat treatment, or heat shock.

PLPHA. Wu, C.H. Warren, H.L.; Sitaraman, K.; Tsai, C.Y. Rockville, Md. : American Society of Plant Physiologists. Plant physiology. Apr 1988. v. 86 (4). p. 1323-1329. 111. Includes references. (NAL Call No.: DNAL 450 P692).

0449

### Water deficit timing effects on yield components in maize.

AGJOAT. Grant, R.F. Jackson, B.S.; Kiniry, J.R.; Arkin, G.F. Madison, Wis. : American Society of Agronomy. This study was designed to determine the interval of sensitivity of maize (*Zea mays* L.) yield components to moisture stress, and to evaluate that interval using estimates of plant available water (PAW). Individual maize plants were grown in containers in a glasshouse. For each treatment, water was withheld until the accumulated water use in well-watered control containers was 20 L, approximately twice the PAW in each container. Containers were well watered at all other times. Containers were weighed to determine water use rates and to estimate PAW. Moisture stress was assumed initiated when water use rates declined below the average for well-watered containers. The interval when kernel number was sensitive to moisture stress began 2 to 7 d after silking and ended 16 to 22 d after silking. Stress initiated prior to silking but relieved within 2 d after silking did not reduce kernel number, kernel weight, or plant yield. The fewest number of kernels, 45% of the control, occurred for stress during the 7-d period after silking. Kernel weight was reduced by stress during the grain filling period, and the lowest weight, 51% of the control, occurred for stress 12 to 16 d after silking. Water use rates in treatment plant containers were compared to estimates of the soil moisture stress index (SMI) determined as the percentage of PAW in the containers. Water use rates declined when SMI declined below thresholds of between 0.20 and 0.30. These thresholds were similar to those reported for other crops. Thus, this analysis demonstrated that parameters based on PAW can be useful for evaluating the timing of moisture stress on maize yield components. Agronomy journal. Jan/Feb 1989. v. 81 (1). p. 61-65. Includes references. (NAL Call No.: DNAL 4 AM34P).

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0450

3,7-di-O-methylquercetin 5-O-glucoside from zea mays.

JAFCAU. Hedin, P.A. Callahan, F.E. Washington, D.C. : American Chemical Society. A novel flavonol glycoside, identified as 3,7-di-O-methylquercetin 5-O-glucoside, was isolated from aqueous homogenates of corn Zea mays whorl tissue. The related aglycon was also identified but was less abundant. Whorl tissue from insect resistant and susceptible corn hybrids contained similar amounts of the glucoside. Journal of agricultural and food chemistry. Aug 1990. v. 38 (8). p. 1755-1757. Includes references. (NAL Call No.: DNAL 381 J8223).

# PLANT TAXONOMY AND GEOGRAPHY

0451

## Detection and identification of *Peronosclerospora sacchari* in maize by DNA hybridization.

PHYTA. Yao, C.L. Magill, C.W.; Frederiksen, R.A.; Bonde, M.R.; Wang, Y.; Wu, P.S. St. Paul, Minn. : American Phytopathological Society. The causal organism of an incidence of maize downy mildew in Southern China proved difficult to classify by standard techniques. The pathogen, subsequently identified as *Peronosclerospora sacchari*, was detected by DNA hybridization in endosperm, pericarp, and pedicel tissues, but not in embryos of infected maize seeds. Plasmid pCLY83, which had been selected from a *P. maydis* DNA library, served as the probe. No evidence for hybridization was detected between the probe and DNAs extracted from ten common seedborne fungi of maize: *Colletotrichum graminicola*, *Acremonium strictum*, *Curvularia lunata*, *Fusarium moniliforme*, *Bipolaris maydis*, *Macrophomina phaseolina*, *Rhizoctonia* sp., *Rhizopus* sp., *Penicillium* sp., and *Alternaria* sp. Hybridization was also not detected with DNAs isolated from plant tissues infected with *Sclerospora graminicola* or *Sclerotophthora macrospora*. The hybridizing DNA of the corn pathogen from China was readily distinguished from *P. sorghi* and *P. maydis* by differences in EcoRI, PvuI, BamHI and HindIII restriction patterns. RFLP patterns on blots of DNA from the plants showing symptoms of downy mildew in this case were the same as those for *P. philippinensis* and *P. sacchari*, now believed to be conspecific. *Phytopathology*. Aug 1991. v. 81 (8). p. 901-905. Includes references. (NAL Call No.: DNAL 464.8 P56).

0452

## The weed flora of Prince Edward Island cereal fields.

WEESA6. Thomas, A.G. Ivany, J.A. Champaign, Ill. : Weed Science Society of America. Field surveys were conducted during 1978 and 1979 to determine the abundance and distribution of weeds in fields seeded to barley, oats, spring wheat, and mixtures of barley and oats in various proportions in the province of Prince Edward Island. Using a stratified random sampling procedure, weeds were counted in 536 fields during the 2-yr survey period. The weed flora had a large number of species that occurred at high densities, probably due to the limited herbicide use on Prince Edward Island. The average total number of species (64), number of species per field (20), and weed density (253 plants/m<sup>2</sup>) were similar among the four crop types and the five Extension Districts of the province. Only 49 of the 77 species encountered during the survey were found in 5% or more of the fields. Low cudweed, corn spurry, and common lambsquarters were the most abundant species, occurring in more than 80% of the fields at a mean density higher than 33.4 plants/m<sup>2</sup>. Red sorrel, smartweed, common hempnettle, broadleaf plantain, and quackgrass were also found in 80% or more of the fields, but at a mean density from 14.4 to 16.5 plants/m<sup>2</sup>. The perennials accounted for 51% of the commonly occurring species, annual and

biennial broadleaf species accounted for 43%, and annual grasses were a minor group with only 6% of the species. *Weed science*. Mar 1990. v. 38 (2). p. 119-124. Includes references. (NAL Call No.: DNAL 79.8 W41).

0453

## Yield characteristics of ancient races of maize compared to a modern hybrid.

AGJOAT. Gardner, F.P. Valle, R.; McCloud, D.E. Madison, Wis. : American Society of Agronomy. Open-pollinated races of maize (*Zea mays L.*) have been cultivated in the Americas since antiquity although their performance is poor compared to modern hybrids. However, morphological-physiological characteristics that contribute to the yield superiority of modern hybrids over ancient lines have not been well documented and such information should be useful in the selection of improved open-pollinated lines and management strategies. Therefore, a study was conducted in Gainesville, FL (29 degrees 38'N lat) to identify and quantify morphological-physiological traits that are responsible for yield differences between ancient and modern hybrid maize cultivars. The characteristics assessed included photosynthetic capacity, grain-filling rate and duration, and photosynthate partitioning. Three Central American ancient lines (Chapalote, Nal-Tel, and Maiz Criollo) and a hybrid (Coker 77) widely adapted to the Southeast USA, were sequentially harvested at 10-d intervals until physiological maturity for growth analysis. Leaf area index (LAI) and vegetative crop growth rate (CGRv) were similar for all genotypes except for Nal-Tel, which had lower values. The hybrid had greater LAI, leaf area duration (LAD), ear and kernel growth rates, as well as kernel number and size. Additionally, the hybrid redistributed more stalk-stored photosynthate to the grain, and its grain-filling period was longer. We conclude that the primary weaknesses of these ancient races compared to hybrids were low LAI and LAD, short grain-filling duration, and low photosynthate redistribution and sink capacity due to fewer and smaller kernels. *Agronomy journal*. Sept/Oct 1990. v. 82 (5). p. 864-868. Includes references. (NAL Call No.: DNAL 4 AM34P).

# PROTECTION OF PLANTS

0454

**Corn & soybean field guide.**

Harms, C.L. Nielsen, R.L.; Semmel, T.W.; Edwards, C.R.; Obermeyer, J.L.; Childs, D.J.; Jordan, T.N.; Scott, D.H. West Lafayette, Ind. : The Service. Publication I.D. - Cooperative Extension Service, Purdue University. May 1988. (179). 85 p. ill., maps. (NAL Call No.: DNAL 275.29 IN2ID).

0455

**Corn pest management in Wisconsin, 1988.**

Doersch, R.E. Doll, J.D.; Wenzel, Kraus, C.R.; Worf, G.L.; Harvey, J. R.A. Johnson, Wis. : The Service. Pub on - University of Wisconsin, Cooperative Extension Service. 1988. (A1684). 60 p. (NAL Call No.: DNAL S544.3.W6W53).

0456

**Production of hybrid seed corn.**

AGRYA. Wych, R.D. Madison, Wis. : American Society of Agronomy. Agronomy. In the series analytic: Corn and Corn Improvement, Third Edition / edited by G.F. Sprague and J.W. Dudley. 1988. (18). p. 565-605. ill. Includes references. (NAL Call No.: DNAL 4 AM392).

0457

**The protection of corn, November 1984 - April 1988 citations from AGRICOLA concerning diseases and other environmental considerations /compiled and edited by Charles N. Bebee.**

Bebee, Charles N. Beltsville, Md. : U.S. Dept. of Agriculture, National Agricultural Library ; Washington, D.C. : U.S. Environmental Protection Agency, Office of Pesticide Programs, 1988. "September 1988." ~ Includes index. 243 p. ; 28 cm. (NAL Call No.: DNAL aZ5076.A1U54 no.69).

0458

**1991 corn: insect, disease, nematode, and weed control recommendations.**

Everest, J.W. Patterson, M.G.; Mask, P. Auburn, Ala. : The Service. Circular ANR - Alabama Cooperative Extension Service, Auburn University. In subseries: Integrated Pest Management. Jan 1991. (428). 10 p. (NAL Call No.: DNAL S544.3.A2C47).

# PESTS OF PLANTS - GENERAL AND MISC.

0459

## Characteristics of bird-resistance in agricultural crops.

PVPCB. Bullard, R.W. Davis, Calif. : University of California. Proceedings ... Vertebrate Pest Conference. Literature review. 1988. (13th). p. 305-309. Includes references. (NAL Call No.: DNAL SB950.A1V4).

Environmental entomology. Oct 1991. v. 20 (5). p. 1251-1258. Includes references. (NAL Call No.: DNAL QL461.E532).

0460

Corn and sorghum breeding and management. AKFRAC. York, J.D. Fayetteville, Ark. : The Station. Arkansas farm research - Arkansas Agricultural Experiment Station. Jan/Feb 1989. v. 38 (1). p. 6. (NAL Call No.: DNAL 100 AR42F).

0463

## Efficacy of trimethacarb as a small mammal repellent in no-till corn plantings.

PVPCB. Matschke, G.H. Bonwell, W.R.; Engeman, R.M. Davis, Calif. : University of California. Proceedings ... Vertebrate Pest Conference. 1988. (13th). p. 82-85. Includes references. (NAL Call No.: DNAL SB950.A1V4).

0461

## Diseases of corn.

AGRYA. Smith, D.R. White, D.G. Madison, Wis. : American Society of Agronomy. Agronomy. In the series analytic: Corn and Corn Improvement, Third Edition / edited by G.F. Sprague and J.W. Dudley. 1988. (18). p. 687-766. ill. Includes references. (NAL Call No.: DNAL 4 AM392).

0464

## Electric fences and commercial repellents for reducing deer damage in cornfields.

WLSBA. Hygnstrom, S.E. Craven, S.R. Bethesda, Md. : The Society. Wildlife Society bulletin. Fall 1988. v. 16 (3). p. 291-296. Includes references. (NAL Call No.: DNAL SK357.A1W5).

0462

Effects of strip intercropping and no-tillage on some pest and beneficial invertebrates of corn in Ohio. EVETEX. Tonhasca, A. Jr. Stinner, B.R. Lanham, Md. : Entomological Society of America. We tested two agronomic practices that are likely to increase plant and structural diversity, no-tillage and strip intercropping, for effects on corn invertebrate fauna. Some of the most common herbivores and natural enemies were sampled by direct counts and damage estimation from 1988 through 1990 on monoculture corn and strips of corn alternated with soybean, under no-tillage and conventional tillage. Among soil pests, cut-worms (mostly the black cutworm, *Agrotis ipsilon* (Hufnagel)); armyworm, *Pseudaletia unipuncta* (Haworth); and slugs (Gastropoda) were more abundant in no-tillage plots, although only slugs caused severe damage. The western corn rootworm, *Diabrotica virgifera virgifera* LeConte, and the European corn borer, *Dstrinia nubitalis* (Hubner), were generally more abundant in conventional tillage plots. Despite crop rotation, the strip-intercropping system (four rows of each crop) was less effective in reducing western corn rootworm infestation, especially in conventional tillage plots. In 1990 only, ladybugs (mostly *Coleomegilla maculata* (DeGeer)) were more abundant in conventional tillage plots, whereas tarnished plant bugs, *Lygus lineolaris* (Palisot de Beauvois), were more abundant in no-tillage plots. Japanese beetle, *Popillia japonica* Newman; stink bugs, *Acrosternum hilare* (Say) and *Euschistus serous* (Say); and spiders (Aranea) were not significantly affected by treatments.

0465

## Evaluating corn varieties for resistance to damage by blackbirds and starlings.

Woronecki, P.P. Dolbeer, R.A.; Otis, D.L. Philadelphia, PA : ASTM, c1988. Vertebrate pest control and management materials : 5th volume / Stephen A. Shumake and Roger W. Bullard, editors. p. 27-38. ill. Includes references. (NAL Call No.: DNAL SB993.4.V47).

0466

## Evaluation of repellent seed treatments and effects on early corn performance.

Koehler, A.E. Johnson, R.J.; Burnside, D.C.; Lowry, S.R. Philadelphia, PA : ASTM, c1988. Vertebrate pest control and management materials : 5th volume / Stephen A. Shumake and Roger W. Bullard, editors. p. 39-51. Includes references. (NAL Call No.: DNAL SB993.4.V47).

0467

## Red-winged blackbird and starling feeding responses on corn earworm-infested corn.

PVPCB. Dkurut-Akol, F.H. Woronecki, P.P. Davis, Calif. : University of California. Proceedings ... Vertebrate Pest Conference. Meeting held March 6-8, 1990, Sacramento, California. July 1990. (14th). p. 296-301. Includes references. (NAL Call No.: DNAL SB950.A1V4).

(PESTS OF PLANTS - GENERAL AND MISC.)

0468

**Reflecting tapes fail to reduce blackbird damage to ripening cornfields.**  
WLSBA. Conover, M.R. Dolbeer, R.A. Bethesda, Md. : The Society. Wildlife Society bulletin. Winter 1989. v. 17 (4). p. 441-443. Includes references. (NAL Call No.: DNAL SK357.A1W5).

0469

**Responses of deer mice to methiocarb and thiram seed treatments.**  
JWMAA9. Holm, B.A. Johnson, R.J.; Jensen, D.D.; Stroup, W.W. Bethesda, Md. : Wildlife Society. Journal of wildlife management. July 1988. v. 52 (3). p. 497-502. Includes references. (NAL Call No.: DNAL 410 J827).

0470

**Utilization of starch matrices for development of corn rootworm specific semiochemical/insecticide delivery systems potential for adult suppression /by Thomas J. Weissling.**  
Weissling, Thomas J. 1990. Thesis (Ph.D.)-University of Nebraska--Lincoln, 1990. iv, 180 leaves : ill. ; 28 cm. Includes bibliographical references. (NAL Call No.: NBU LD3656.5 1990 W357).

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0471

**Aboveground dry weight and yield responses of irrigated field corn to defoliation and root pruning stresses.**

JEENAI. Gibb, T.J. Higgins, R.A. Lanham, Md. : Entomological Society of America.

Insecticide-modified levels of western corn rootworm, *Diabrotica virgifera virgifera* LeConte, larval feeding, manually applied preautotrophic (seedling stage) defoliation, and autotrophic (four-leaf stage) defoliation were evaluated for their independent and combined effects on aboveground dry matter production and grain yield of field corn, *Zea mays L.* Defoliations were imposed to simulate cutworm feeding damage, late frosts, or hail. Total reductions in leaf dry weight attributable to treatments became less evident as plants compensated over time. However, leaf groups undergoing initiation or expansion when stresses were imposed produced significantly less dry weight after each treatment was applied and were not able to compensate fully by season's end. Stalk dry weights showed less change than leaves after treatment. However, once detectable, reductions in stalk dry weight remained significant throughout the growing season. Decreases of 3-12% in corn yield were attributable to root pruning stress from larval feeding. Grain yield decreased 3-9% in response to seedling defoliation and 13-22% following four-leaf stage defoliation. Yield declines resulted from reduction of total kernels per ear (both kernels per row and kernel rows) and not from kernel weight, which suggests that treatments effectively stressed plants before or during kernel initiation rather than during kernel fill. Significant treatment interactions were evident in responses of some vegetative and dry weight yield parameters. In each instance, less reduction was caused by combinations of treatments than was expected if effects of single treatments were added. Journal of economic entomology. Oct 1991. v. 84 (5). p. 1562-1576. Includes references. (NAL Call No.: DNAL 421 J822).

twospotted spider mite. Several combinations of insecticides with a synergist and other insecticides were highly toxic to mites and could be important for improving field control. The combinations of bifenthrin + formamidine and dimethoate + pyrethroids were very toxic to mites. Journal of economic entomology. Aug 1990. v. 83 (4). p. 1236-1242. Includes references. (NAL Call No.: DNAL 421 J822).

0473

**Adult northern and western corn rootworm (Coleoptera: Chrysomelidae) population dynamics and oviposition.**

JKESA. Hein, G.L. Tollefson, J.U.; Foster, R.E. Lawrence, Kan. : The Society. Journal of the Kansas Entomological Society. Apr 1988. v. 61 (2). p. 214-223. Includes references. (NAL Call No.: DNAL 420 K13).

0474

**Aflatoxin contamination in selected corn germplasm classified for resistance to European corn borer (Lepidoptera: Noctuidae).**

JESCEP. McMillian, W.W. Widstrom, N.W.; Barry, D.; Lillehoj, E.B. Tifton, Ga. : The Entomological Science Society. Journal of entomological science. July 1988. v. 23 (3). p. 240-244. Includes references. (NAL Call No.: DNAL QL461.G4).

0475

**AGnews: vine weevil targeted; ag fellowship award; more fuel alcohol.**

San Francisco, Calif. : Deborah J. Mysiewicz. BioEngineering news. Sept 15, 1990. v. 11 (38). p. 2, 8. (NAL Call No.: DNAL A00033).

0476

**Alternative formulations of the mixed-model ANOVA applied to quantitative genetics.**

EVOLA. Ayres, M.P. Thomas, D.L. Lawrence, Kan. : Society for the Study of Evolution. Evolution. Feb 1990. v. 44 (1). p. 221-226. Includes references. (NAL Call No.: DNAL 443.8 EV62).

0477

**Ambulatory dispersal of spider mites (Acari: Tetranychidae) on whole, untreated maize plants after exposure to fenvalerate and permethrin.**

JEENAI. Berry, J.S. Holtzer, T.O.; Ball, H.J. Lanham, Md. : Entomological Society of America. Behavioral responses reported for spider mites encountering pyrethroid insecticides on treated plant surfaces have included increased dispersal and cessation of feeding. In our laboratory study, pyrethroid insecticides were applied directly to Banks grass mite,

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Oligonychus pratensis (Banks), and twospotted spider mite, Tetranychus urticae (Koch), that were then released onto untreated maize, Zea mays L., plants. Initially, a greater proportion of chemically treated mites dispersed compared with untreated mites or those treated with water. Vertical distributions of the two species were similar except after the permethrin treatment. Permethrin inhibited Banks grass mite upward dispersal compared with fenvalerate, water treatments, and controls, whereas twospotted spider mite upward dispersal was not inhibited. Journal of economic entomology. Feb 1990. v. 83 (1). p. 217-220. Includes references. (NAL Call No.: DNAL 421 J822).

0478

### Analysis of spatial patterns and sequential count plans for stalk borer (Lepidoptera: Noctuidae).

EVETEX. Davis, P.M. Pedigo, L.P. Lanham, Md. : Entomological Society of America. Stalk borer larvae, *Papaipema nebris* (Guenee), were sampled from noncrop, grassy areas and adjacent corn rows to investigate seasonal changes in dispersion and to develop a sampling program for this pest. Regression coefficients for Taylor's power law and Iwao's mean crowding regression indicated an aggregated spatial arrangement for stalk borers in noncrop areas. This aggregated pattern was attributed to the oviposition behavior of stalk borer adults. Although coefficients of Taylor's power law are thought to be species-specific constants, both Taylor's power law and Iwao's mean crowding regression reflected significant changes in dispersion between plants in a row, with dispersion varying from regular to slightly aggregated. We hypothesized that radical changes in behavior, such as movement from grass to corn, may alter spatial distribution. A high correlation between Taylor's power law coefficients, *a* and *b*, suggests that *a* may reflect aggregation rather than being a species-specific constant as previously suggested by Taylor. Additional analysis of dispersion between sections of row showed that larvae tended to be aggregated, with clump size a single individual. Single-stage sequential count plans for noncrop areas and two-staged, fixed-*k*, sequential count plans for corn that are suitable for intensive population research and pest management surveys were developed and discussed. Environmental entomology. June 1989. v. 18 (3). p. 504-509. Includes references. (NAL Call No.: DNAL QL461.E532).

0479

### Annual contamination of *Heliothis zea* (Lepidoptera: Noctuidae) moths with *Aspergillus flavus* and incidence of aflatoxin contamination in preharvest corn in the Georgia Coastal Plain.

JESCEP. McMillan, W.W. Widstrom, N.W.; Wilson, D.M.; Evans, B.D. Tifton, Ga. : Georgia Entomological Society. Journal of entomological science. Jan 1990. v. 25 (1). p. 123-124. (NAL

Call No.: DNAL QL461.G4).

0480

### *Archytas marmoratus* (Diptera: Tachinidae): field survival and performance of mechanically extracted maggots.

EVETEX. Gross, H.R. Jr. College Park, Md. : Entomological Society of America. Mechanically extracted maggots of *Archytas marmoratus* (Townsend) (AM) were evaluated against larvae of *Heliothis zea* (Boddie) and *Spodoptera frugiperda* (J.E. Smith) in whorl and early tassel stage corn, Zea mays L. Survival of AM maggots applied in whorl-stage corn declined significantly, from 80.5% at time of application, to 53.3 and 14.6% by 72 and 120 h after application, respectively. Rates of AM parasitization of *H. zea* larvae offered 24, 48, and 72 h after maggots were applied in early-tassel stage corn declined progressively over the 3 d. Conversely, rates of AM parasitization of *H. zea* larvae increased progressively with time of continuous exposure to maggots up to 32 h. Rates of AM parasitization of *H. zea* larvae tended to increase progressively from the third- to the fifth-instar larvae. Rates of AM parasitization of fourth- and fifth-instar *H. zea* larvae increased progressively and significantly with densities of 5, 10, and 20 AM maggots per plant. Increases in rates of AM parasitization of fifth-instar *S. frugiperda* larvae exposed to similar maggot densities were inconsistent, but were generally lower than the rates of parasitization of *H. zea* larvae. Environmental entomology. Apr 1988. v. 17 (2). p. 233-237. Includes references. (NAL Call No.: DNAL QL461.E532).

0481

### Association between karyotype and host plant in corn leaf aphid (Homoptera: Aphididae) in the northwestern United States.

EVETEX. Blackman, R.L. Halbert, S.E.; Carroll, T.W. Lanham, Md. : Entomological Society of America. Samples of *Rhopalosiphum maidis* (Fitch) taken from corn in Idaho and Montana from 1985 to 1987 were karyotyped and found to be  $2n = 8$ , whereas those from barley and barnyard grass (*Echinochloa crus-galli* (L.) P. Beauv.) were  $2n = 10$ . Samples from wheat in Idaho in 1987 had a mixture of karyotypes ( $2n = 8, 9$ , and  $10$ ). The results indicate highly selective colonization of corn and barley by different genotypes of *R. maidis*, so it is unlikely that this aphid can carry barley yellow dwarf virus (BYDV) between these two crops. *E. crus-galli* may be an important reservoir host for BYDV isolates vectored by *R. maidis* to barley and winter wheat. Environmental entomology. June 1990. v. 19 (3). p. 609-611. Includes references. (NAL Call No.: DNAL QL461.E532).

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0482

### Attractants for the northern corn rootworm (Coleoptera: Chrysomelidae): alkyl- and alkenylphenols.

JEENAI. McGovern, T.P. Ladd, T.L. Jr. Lanham, Md. : Entomological Society of America. Attractant studies with the northern corn rootworm, *Diabrotica barberi* Smith & Lawrence, showed it to be strongly attracted to four monosubstituted phenols. The structures of three of the attractive phenols differ from the structures of three highly effective attractants for *D. barberi* reported previously, eugenol (4-allyl-2-methoxyphenol), isoeugenol (2-methoxy-4-1-propenyl phenol), and 2-methoxy-4-propylphenol, in that they do not have a methoxy substituent. The 2-methoxy group, therefore, does not appear to be an essential structural feature necessary for high levels of *D. barberi* attraction. 4-(1-Propenyl)phenol was the most effective monosubstituted phenol in the study, with no significant difference in attractiveness, either early or late in the season, between it and eugenol. 2-(1-Propenyl)phenol was the only phenol substituted other than at the 4-position to show a high level of attractiveness. As the trapping season progressed, the response of *D. barberi* toward 2-(1-propenyl)phenol increased substantially. It was significantly less attractive than eugenol early in the season, but near the end of the season its mean catch was not significantly different from that of eugenol. The E isomer of 2-(1-propenyl)phenol was highly attractive to *D. barberi*; the Z isomer was only slightly attractive. Thus, the 1-propenyl group, in conjunction with the hydroxyl group, appears to be especially effective in activating the attractive response of *D. barberi*. Journal of economic entomology. Aug 1990. v. 83 (4). p. 1316-1320. Includes references. (NAL Call No.: DNAL 421 J822).

0483

### Bacteria isolated from southern corn rootworms, *Diabrotica undecimpunctata howardi* (Coleoptera: Chrysomelidae), reared on artificial diet and corn.

EVETEX. Tran, M.T. Marrone, P.G. Lanham, Md. : Entomological Society of America. Bacteria in the guts of southern corn rootworms, *Diabrotica undecimpunctata howardi* Barber, feeding on artificial diet (AD larvae) and on corn roots (CR larvae) were studied. Species composition and abundance of gut-inhabiting bacteria differed between AD larvae and CR larvae. The total bacterial population in AD larvae was about 100 times less than those in CR larvae. The majority of bacterial species found in the gut of CR larvae were glucose fermenters, whereas the major bacteria found in AD larvae were fluorescent pseudomonads. *Enterobacter cloacae* was predominant among glucose-fermenting bacteria in CR larvae. *Pseudomonas putida*, *P. fluorescens*, and *Agrobacterium* sp. were major bacteria in the glucose nonfermenting bacteria group in CR larvae and AD larvae. The numbers of fluorescent *Pseudomonas* spp. and *Agrobacterium* sp. found in CR larvae were positively

correlated with their population on corn roots. Environmental entomology. Oct 1988. v. 17 (5). p. 832-835. Includes references. (NAL Call No.: DNAL QL461.E532).

0484

### Behavioral responses of western corn rootworm larvae to volatile semiochemicals from corn seedlings.

JCECD. Hibbard, B.E. Bjostad, L.B. New York, N.Y. : Plenum Press. Journal of chemical ecology. June 1988. v. 14 (6). p. 1523-1539. iii. Includes references. (NAL Call No.: DNAL QD415.A1J6).

0485

### Big-eyed bugs (Hemiptera: Lygaeidae) and the striped lynx spider (Araneae: Oxyopidae): intra- and interspecific interference on predation of first instar corn earworm (Lepidoptera: Noctuidae).

JESCEP. Guillebeau, L.P. All, J.N. Tifton, Ga. : Georgia Entomological Society. Journal of entomological science. Jan 1990. v. 25 (1). p. 30-33. Includes references. (NAL Call No.: DNAL QL461.G4).

0486

### Bioactivity of *Liriope muscari* (Liliaceae) extracts to corn earworm (Lepidoptera: Noctuidae).

JEENAI. Adeyeye, O.A. Blum, M.S. Lanham, Md. : Entomological Society of America. Artificial diets fortified with varying concentrations of *Liriope muscari* Bailey foliage and fed to corn earworm, *Heliothis zea* (Boddie), caused symptoms similar to those induced by consumption of the nonprotein amino acid L-azetidine-2-carboxylic acid. A concentration as low as 5% (wt/vol) foliage in the diet significantly affected larval growth and development; effects were more severe in larvae reared on higher concentrations. Incorporation of foliage into the larval diet adversely affected larval survival and weight gain, number of days to pupation, percentage of normal pupation, number of days to emergence, percentage of adult emergence, rate of adult deformity, fecundity, and fertility. Journal of economic entomology. June 1989. v. 82 (3). p. 942-947. Includes references. (NAL Call No.: DNAL 421 J822).

0487

### Biological control of *Heliothis* spp. emphasizing the present and potential role of *Microplitis croceipes*.

King, E.G. Powell, J.E. College Station, Tex. : Southwestern Entomological Society. Supplement to the southwestern entomologist. Feb 1989. (12). p. 1-9. Includes references. (NAL Call No.: DNAL QL461.S65 SUPPL.).

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0488

**Biological effects and toxicokinetics of DIMBOA in Diadegma terebrans (Hymenoptera: Ichneumonidae), an endoparasitoid of Ostrinia nubilalis (Lepidoptera: Pyralidae).**  
JEENAI. Campos, F. Donskov, N.; Arnason, J.T.; Philogene, B.J.R.; Atkinson, J.; Morand, P.; Werstiuk, N.H. Lanham, Md. : Entomological Society of America.  
2,4-dihydroxy-7-methoxy-1,4-benzoxazin-3-one (DIMBOA), the major hydroxamic acid present in corn, was tested for its effect on the endoparasitoid of *Ostrinia nubilalis* (Hubner), *Diadegma terebrans* (Gravenhorst). The compound was fed to *O. nubilalis* (0.3 mg DIMBOA/g diet), and the response of the parasitoid was measured in terms of development time and weight and mortality at the pupal and adult stages. DIMBOA increased mean time to pupation and mean time to adult emergence for both males and females. Male and female pupal and adult weights decreased in the presence of DIMBOA. DIMBOA also was associated with increased mortality of parasitized *O. nubilalis* larvae, but final percentage parasitization was significantly increased by the compound (28.1 versus 41.0%). Parasitoids pupating from *O. nubilalis* larvae fed a diet containing 3H-DIMBOA showed levels of 3H compounds (determined by measuring the level of tritium in the samples) over twice as high (per gram weight) as the *O. nubilalis* pupae. At adult emergence, higher levels of 3H compounds were found in the cocoon and meconium than in the adult; higher levels were present in males than in females. Journal of economic entomology. Apr 1990. v. 83 (2). p. 356-360. Includes references. (NAL Call No.: DNAL 421 J822).

0489

**Breeding for insect resistance in maize.**  
Guthrie, W.D. Portland, Or. : Timber Press. Plant breeding reviews. Literature review. 1989. v. 6. p. 209-243. Includes references. (NAL Call No.: DNAL SB123.P55).

0490

**Center-pivot applications of chlorpyrifos 4E for reducing ear and stalk infestations of second-generation European corn borer larvae (Lepidoptera: Pyralidae) in field corn.**  
JEENAI. Currier, D.R. Witkowski, J.F. Lanham, Md. : Entomological Society of America. Journal of economic entomology. Dec 1988. v. 81 (6). p. 1765-1767. Includes references. (NAL Call No.: DNAL 421 J822).

0491

**Cinnamyl alcohol and analogs as attractants for corn rootworms (Coleoptera: Chrysomelidae).**  
JEENAI. Metcalf, R.L. Lampan, R.L. Lanham, Md. : Entomological Society of America. Field tests in corn with baited sticky traps focused on changes in species specificity and magnitude of

response for *Diabrotica barberi* Smith and Lawrence and *D. virgifera virgifera* LeConte when candidate lures varied by functional group, chain length, aryl substituents, saturated and unsaturated sidechains, and isosteric replacement. Cinnamyl alcohol, a major component of the blossom volatiles of *Cucurbita maxima* Duchesne, and its parakairomone (active synthetic analog), 3-phenyl-1-propanol, were significantly more attractive to *D. barberi* than eugenol in corn and were also attractive to *D. cristata* (Harris) in a reclaimed prairie. Neither compound was appreciably attractive to adult western corn rootworms *D. v. virgifera* and, as previously reported, cinnamyl alcohol is only slightly attractive to adult southern corn rootworms, *D. undecimpunctata howardi* Barber. The spectrum of rootworm responses to curcurbit blossom components and structurally related compounds amplifies the coevolutionary relationships between *Diabroticites* and *Cucurbitaceae*, shows the chemosensory specificity of odor-conditioned behavior in *Diabrotica* spp., and illustrates the potential of parakairomones as practical insect lures. Journal of economic entomology. Dec 1989. v. 82 (6). p. 1620-1625. Includes references. (NAL Call No.: DNAL 421 J822).

0492

**Colonization of six exotic parasites (Hymenoptera) against *Diatraea grandiosella* (Lepidoptera: Pyralidae) in corn.**  
EVETEX. Overholt, W.A. Smith, J.W. Jr. Lanham, Md. : Entomological Society of America. Six exotic parasites, *Trichogramma atopovirilia* Oatman & Platner, *Allorhogas pyralophagus* Marsh, *Cotesia flavipes* Cameron, *Macrocentrus prolificus* Wharton, *Digonogastra kimballi* Kirkland, and *Pediobius furvus* (Gahan), were colonized in commercial corn fields in the Texas High Plains against *Diatraea grandiosella* Dyar from 1985 to 1987. Colonization sites were monitored to estimate parasitization, dispersal, and parasite overwintering. *D. kimballi*, an external parasite of late instars, dispersed farther than other species and was the only parasite to demonstrate a propensity for overwintering. The pupal parasite, *P. furvus*, was capable of causing seasonal parasitization as high as 50.0% within 10 m of the colonization locus and showed the strongest numerical increase. The egg parasite, *T. atopovirilia*, caused 33.6% parasitization within 2 m of the colonization locus but was not recovered at greater distances. Parasitization by *A. pyralophagus*, which attacks medium-sized larvae, never exceeded 3.6% in any year of the study. Seasonal parasitization of *C. flavipes*, a parasite of late instars, was 0.0-14.5%, but the potential of this parasite as an effective natural enemy of *D. grandiosella* is limited by apparent encapsulation in the hosts and inability to overwinter. The polyembryonic larval parasite, *M. prolificus*, was not recovered during the 3-yr study. An aggregative response to host density was not detected for any of the parasites. The results of this study suggest that *D. kimballi* may be able to establish in

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the Texas High Plains, and that *P. furvus* may have potential as a biological control agent in a seasonal inoculative or inundative approach. Environmental entomology. Dec 1990. v. 19 (6). p. 1889-1902. Includes references. (NAL Call No.: DNAL QL461.E532).

0493

**Combining ability for resistance in corn to fall armyworm and southwestern corn borer.** CRPSAY. Williams, W.P. Buckley, P.M.; Davis, F.M. Madison, Wis. : Crop Science Society of America. Both the fall armyworm, *Spodoptera frugiperda* (J.E. Smith), and the southwestern corn borer, *Diatraea grandiosella* Dyar, feed extensively on the leaves of corn, *Zea mays* L., in the southern USA. Their feeding can cause serious yield reductions. Several germplasm lines with resistance to leaf feeding by these two insect pests have been developed and released; however, only limited information is available on the inheritance of this resistance. No previous information on the relationships between resistance to fall armyworm and southwestern corn borer has been reported. The current investigation was undertaken to obtain information on the relative importance of general and specific combining ability in the inheritance of resistance to fall armyworms and southwestern corn borers and to compare the responses of the two insects to a diallel cross among inbred lines with varying degrees of resistance. Larval survival and growth were used to quantify levels of resistance. General combining ability was a highly significant source of variation among hybrids, but specific combining ability was a nonsignificant source of variation. Fall armyworm larval survival and weight on hybrids with varying levels of resistance were highly correlated with southwestern corn borer survival and weight on the same hybrids. This suggests that selecting for resistance to one of these insects should increase resistance to both. Crop science. July/Aug 1989. v. 29 (4). p. 913-915. Includes references. (NAL Call No.: DNAL 64.8 C883).

0494

**Comparative evaluation of three exotic insect parasites (Hymenoptera: Braconidae) against the southwestern corn borer (Lepidoptera: Pyralidae) in corn.** EVETEX. Overholt, W.A. Smith, J.W. Jr. Lanham, Md. : Entomological Society of America. Three exotic larval parasites, *Allorhogas pyralophagus* Marsh and *Digonogastra kimballi* Kirkland from Mexico and *Cotesia flavipes* (Cameron) from the Indo-Australian region, were evaluated in enclosures in commercial corn fields in Castro County, Tex., against the southwestern corn borer, *Diatraea grandiosella* Dyar. Experiments conducted in 1986 measured the functional and numerical responses of the three parasites to varying host density. The effect of varying the number of searching parasites on parasitization and reproductive capacity was evaluated in 1987. The functional

responses of the three parasites to host density were markedly different. *D. kimballi* exhibited the strongest response, which is hypothesized as a reflection of the coevolutionary history between this parasite and the southwestern corn borer. The responses of parasites to varying parasite density were not different among the three species. In both experiments, encapsulation of immature parasites of *C. flavipes* was observed. The numerical responses of the three parasites were weak; only *C. flavipes* produced a greater number of female progeny than the number of females introduced per enclosure. Environmental entomology. Aug 1990. v. 19 (4). p. 1155-1162. Includes references. (NAL Call No.: DNAL QL461.E532).

0495

**Comparative growth and spatial distribution of *Dalbulus* leafhopper populations (Homoptera: Cicadellidae) in relation to maize phenology.** EVETEX. Todd, J.L. Madden, L.V.; Nault, L.R. Lanham, Md. : Entomological Society of America. The population growth and spatial distribution of three *Dalbulus* leafhopper species were monitored on maize (*Zea mays* L.) from the seedling stage through maturation and senescence under greenhouse conditions. *D. maidis*, a maize specialist, completed two generations before maize senescence, with a significant population increase between the first and second generation. F1 nymphs and adults moved upward on leaves (vertically) and from outer leaves into whorls (horizontally) soon after eclosion. *D. gelbus*, a gamagrass (wild maize relative) specialist also found on maize in the field, completed two generations on maize, but with a significant decrease in population size between generations. *D. gelbus* moved upward on leaves as F1 nymphs and adults, but not into whorls as frequently as *D. maidis*. *D. quinquepunctatus*, a gamagrass specialist, produced one generation on maize, with population extinction occurring soon after adult eclosion on post-anthesis maize. Nymphs and adults remained within protective leaf sheaths of lower leaves, and did not move upward on leaves or into whorls. Some individuals moved onto tillers developing at the base of maize stalks. Utilization of the whorl is suggested to be critical in establishing a large second generation before maize senescence. Differences in the behavioral responses of *Dalbulus* species to maize phenology, may explain, in part, the observed field host associations, and influence pest potential of *Dalbulus* species. Environmental entomology. Apr 1991. v. 20 (2). p. 556-564. Includes references. (NAL Call No.: DNAL QL461.E532).

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0496

### The comparative response of *Diabrotica* species (Coleoptera: Chrysomelidae) to volatile attractants.

EVETEX. Lampman, R.L. Metcalf, R.L. College Park, Md. : Entomological Society of America. Field tests conducted in a relict prairie using sticky traps baited with a broad range of adult diabroticine attractants showed *Diabrotica cristata* (Harris) shares some chemosensory responses with both *D. barberi* Smith and Lawrence and *D. virgifera virgifera* LeConte. *D. cristata* was attracted to estragole, beta-ionone, para-methoxycinnamaldehyde, and a mixture of trimethoxybenzene, indole, and cinnamaldehyde (=TIC mixture) (attractants for adults of *D. virgifera virgifera* in corn tests), as well as eugenol, isoeugenol, and cinnamyl alcohol (attractants for adults of *D. barberi* in corn tests). Several of the active compounds, such as cinnamyl alcohol and beta-ionone, are structurally distinct from the previously described eugenol-type attractants for *D. barberi* and *D. cristata* and represent new semiochemicals for the genus. In the prairie trials, *D. barberi* adults were anomalously attracted to two lures (estragole and the TIC mixture) that were not active in corn evaluations. Environmental entomology. Aug 1988. v. 17 (4). p. 644-648. Includes references. (NAL Call No.: DNAL QL461.E532).

0497

### A comparative study of adult emergence phenologies of *Heliothis virescens* (F.) and *H. zea* (Boddie) (Lepidoptera: Noctuidae) on various hosts in field cages.

EVETEX. Hayes, J.L. College Park, Md. : Entomological Society of America. Emergence rates and timing of emergence of cotton bollworm (CBW), *Heliothis zea* (Boddie), and tobacco budworm (TBW), *H. virescens* (F.), each reared concurrently in field cages erected over three host crops, differed characteristically among hosts. Sorghum produced the highest total number of CBW moths, followed by cotton, and then corn; pigeon pea yielded the highest number of TBW, followed by cotton; sesame failed to support TBW development. Sex ratios differed between the TBW and CBW (1:0.99 and 1:0.90 male/female, respectively; P less than 0.01; t test, df = 3), but were consistent across all hosts per species. Emergence patterns of females and males for each host were significantly correlated; however, females frequently began to emerge first and reached 50% emergence 24-72 h prior to males. Environmental entomology. Apr 1988. v. 17 (2). p. 344-349. Includes references. (NAL Call No.: DNAL QL461.E532).

0498

### Comparison of adult and egg sampling for predicting subsequent populations of western and northern corn rootworms (Coleoptera: Chrysomelidae).

JEENAI. Tollefson, J.J. Lanham, Md. : Entomological Society of America. The utility of six adult- and three egg-sampling techniques for predicting the subsequent season's larval western corn rootworm, *Diabrotica virgifera virgifera* LeConte, and northern corn rootworm, *Diabrotica barberi* (Smith and Lawrence), damage was tested in seven study sites over a 2-yr period in northeastern Iowa. Egg-density estimates produced when employing the sampling techniques as proposed in the literature did not account for a significant amount of variability in subsequent root damage. Four of the adult-sampling techniques accounted for a relatively small but significant amount of variability in root damage. The techniques, ranked on the basis of the amount of variation for which they accounted, were 10-plant count, sticky ear of corn, 10-min collection, and 10-ear-tip collection. The stepwise regression technique for model building was used to determine the form that root damage prediction equations should take and when adult population estimates should be obtained to be used for predicting root damage. It was decided that the equation should be a second-degree quadratic. The chronological week of the year during which beetle densities should be sampled was influenced by the maturity of the crop if the sampling technique emphasized the flowers or fruiting bodies of the host plant. Journal of economic entomology. Apr 1990. v. 83 (2). p. 574-579. Includes references. (NAL Call No.: DNAL 421 J822).

0499

### Comparison of an adult and larval control strategy for the European corn borer (Lepidoptera: Pyralidae) in seed corn.

JKESA. Derrick, M.E. Showers, W.B. Lawrence, Kan. : The Society. Journal of the Kansas Entomological Society. Apr 1991. v. 64 (2). p. 185-192. Includes references. (NAL Call No.: DNAL 420 K13).

0500

### Control of insects on corn.

Johnson, D.R. Jones, B.F. Little Rock, Ark. : The Service. EL - University of Arkansas, Cooperative Extension Service. June 1990. (274, rev.). 11 p. (NAL Call No.: DNAL 275.29 AR4LE).

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0501

**Control of larval northern corn rootworm (Diabrotica barberi) with two Steinernematid nematode species.**

JONEB. Thurston, G.S. Yule, W.N. Lake Alfred, Fla. : Society of Nematologists. Journal of nematology. Jan 1990. v. 22 (1). p. 127-131. Includes references. (NAL Call No.: DNAL QL391.N4J62).

0502

**Control of the banks grass mite (Acari: Tetranychidae) with bifenthrin and propargite applied at different growth stages of corn.**  
JEENAI. Archer, T.L. Bynum, E.D. Jr. Lanham, Md. : Entomological Society of America. Our research was designed to determine the effect of corn, Zea mays L., growth stage on susceptibility of Banks grass mite, Oligonychus pratensis (Banks), to the acaricides bifenthrin and propargite. The chemicals were applied when corn was in the following growth stages: stage 3, 12 leaves fully emerged from the whorl; stage 5, 50% pollination; and stage 7, kernels in the dough stage. An advantage of using propargite at any particular plant growth stage was not identified. In contrast, control of Banks grass mite by bifenthrin applied at 0.07 kg (AI)/ha was best at growth stage 3 control of Banks grass mite did not differ among the growth stage treatments when bifenthrin was applied at 0.09 kg (AI)/ha. The differential susceptibility of Banks grass mite to bifenthrin applied at 0.07 kg (AI)/ha may be the result of a physiological interaction between plant biochemistry and mite susceptibility to acaricides at certain growth stages or low mite densities at application. When the effect of mite density was evaluated, we observed no difference in Banks grass mite control with bifenthrin regardless of mite abundance at application. Therefore, we conclude that better control by bifenthrin on vegetative corn at the marginal application rate of 0.07 kg (AI)/ha was probably the result of physiological effects of the plant on Banks grass mite susceptibility to the acaricide. Journal of economic entomology. Aug 1990. v. 83 (4). p. 1621-1625. Includes references. (NAL Call No.: DNAL 421 J822).

0503

**Corn borer vaccine by crop genetics passes two tests.**

WSJDAF. Allen, F. New York, N.Y. : Dow Jones. The Wall Street journal. Nov 10, 1989. p. B4. (NAL Call No.: DNAL 284.28 W15).

0504

**Corn earworm.**

Foster, R.E. Edwards, C.R. West Lafayette, Ind. : The Service. E - Purdue University, Cooperative Extension Service. In subseries: Field Crop Insects. June 1990. (31.rev). 3 p. (NAL Call No.: DNAL SB844.I6P8).

0505

**Corn earworm control on vegetables.**

Speese, J. III. Zehnder, G.W. Blacksburg, Va. : Virginia Polytechnic Inst. and State University Cooperative Ext. Service. The Vegetable grower's news. Mar/Apr 1990. v. 44 (5). p. 3. (NAL Call No.: DNAL 275.28 V52).

0506

**Corn earworms and seed corn production.**

Randell, R. Urbana, Ill. : Cooperative Extension Service, Univ of Illinois at Urbana-Champaign, 1991. Illinois Agricultural Pesticides Conference summaries of presentations January 8, 9, 10, 1991, Urbana, Illinois / Univ of Illinois at Urbana-Champaign, Coop Ext Serv, in coop with the Illinois Natural History Survey. "Proceedings of the 1991 Illinois Agricultural Pesticides Conference," January 8-10, 1991, Urbana, Illinois. p. 53-55. (NAL Call No.: DNAL SB950.2.I3I4).

0507

**Corn leaf aphid.**

Edwards, C.R. Bledsoe, L.W.; Turpin, F.T. West Lafayette, Ind. : The Service. E - Purdue University, Cooperative Extension Service. In subseries: Field Crop Insects. July 1991. (58.rev.). 2 p. (NAL Call No.: DNAL SB844.I6P8).

0508

**Corn leaf aphid.**

Edwards, C.R. Bledsoe, L.W.; Turpin, F.T. West Lafayette, Ind. : The Service. E - Purdue University, Cooperative Extension Service. In subseries: Field Crops Insects. Dec 1990. (58.rev.). 2 p. ill. (NAL Call No.: DNAL SB844.I6P8).

0509

**Corn semiochemicals and their effects on insecticide efficacy and insecticide repellency toward western corn rootworm larvae (Coleoptera: Chrysomelidae).**

JEENAI. Hibbard, B.E. Bjostad, L.B. Lanham, Md. : Entomological Society of America. Volatile corn seedling (pre-stage 0 germinated seed) semiochemicals are attractive to larvae of the

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western corn rootworm, *Diabrotica virgifera virgifera* LeConte and were evaluated with insecticides in laboratory soil bioassays to determine attraction and increased mortality of larvae. Insecticides from four different chemical classes were tested. These were carbofuran (carbamate), fonofos (organophosphate), tefluthrin (pyrethroid), and 2'-bromo-4'-nitro-perfluorocyclohexane carboxanilide (EL-499, experimental, Eli Lilly Company). For each of the four insecticides tested in bioassays in soil with insecticide present in a central core, significantly more larvae were killed after 24 h when corn seedling volatiles were present in the core than when they were not. The enhanced rate of mortality was the result of larval attraction. In bioassays without soil present, significantly more larvae contacted an insecticide source after 30 min when corn seedling volatiles were present than when they were absent. Insecticide repellency was evaluated in soil bioassays (24 h) and in Petri dish bioassays (30 min) in the presence and absence of volatile corn seedling semiochemicals. Only fonofos was repellent, but the attractiveness of corn seedling semiochemicals overcame that repellency. Journal of economic entomology. June 1989. v. 82 (3). p. 773-781. ill. Includes references. (NAL Call No.: DNAL 421 J822).

0510

**Correlation of phenolic acid content of maize to resistance to *Sitophilus zeamais*, the maize weevil, in CIMMYT's collections.**  
JCECD. Classen, D. Arnason, J.T.; Serratos, J.A.; Lambert, J.D.H.; Nozzolillo, C.; Philogene, B.J.R. New York, N.Y. : Plenum Press. The (E)-ferulic acid content of the grain of nine populations of land races of maize derived from CIMMYT's collections was found to be negatively correlated to susceptibility characteristics towards the maize weevil *Sitophilus zeamais*. Correlation coefficients for six susceptibility parameters and (E)-ferulic acid content were significant and ranged from -0.58 to -0.79. A multiple regression analysis by the SAS forward procedure using the primary seed characteristics associated with susceptibility indicated that the ferulic acid content was the only significant factor in explaining variation in at least two susceptibility parameters: the Dobie index and adult preference. In 15 CIMMYT pools, correlations between four susceptibility parameters and (E)-ferulic acid content were also significant (-0.76 to -0.81). The results suggest that phenolic acid content is a leading indicator of grain resistance or susceptibility to insects and may represent a newly identified mechanism of resistance. Journal of chemical ecology. Feb 1990. v. 16 (2). p. 301-315. Includes references. (NAL Call No.: DNAL QD415.A1J6).

0511

**Crop Genetics Inc. reports success against corn pest.**  
Gladwell, M. Washington, D.C. : The Washington Post Co. The Washington post. Nov 20, 1989. p. 5-6. (NAL Call No.: DNAL A00069).

0512

**Current status of fall armyworm host strains.**  
FETMA. Pashley, D.P. Gainesville, Fla. : Florida Entomological Society. Florida entomologist. Paper presented at the "Fall Armyworm Symposium", 1988. Sept 1988. v. 71 (3). p. 227-234. maps. Includes references. (NAL Call No.: DNAL 420 F662).

0513

**Damage by stalkborers (Lepidoptera: Pyralidae) to corn in northeastern Mexico.**  
JEENAI. Rodriguez-del-Bosque, L.A. Smith, J.W. Jr.; Browning, H.W. Lanham, Md. : Entomological Society of America. Journal of economic entomology. Dec 1988. v. 81 (6). p. 1775-1780. Includes references. (NAL Call No.: DNAL 421 J822).

0514

**Damage in field corn (*Zea mays* (L.)) caused by *Loxagrotis albicosta* (Smith) /by Larry L. Appel.**  
Appel, Larry L. 1991. Thesis (M.S.)--University of Nebraska--Lincoln, 1991. v, 38 leaves ; 28 cm. Includes bibliographical references. (NAL Call No.: NBU LD3656 1991 A674).

0515

**Development of a corn rootworm (*Diabrotica*, Coleoptera: Chrysomelidae) larval threshold for Ohio.**  
JKESA. Reed, J.P. Hall, F.R.; Taylor, R.A.J.; Wilson, H.R. Lawrence, Kan. : The Society. Journal of the Kansas Entomological Society. Jan 1991. v. 64 (1). p. 60-68. Includes references. (NAL Call No.: DNAL 420 K13).

0516

**Development of an electronic system for detecting *Heliothis* spp. moths (Lepidoptera: Noctuidae) and transferring incident information from the field to a computer.**  
JEENAI. Hendricks, D.E. Lanham, Md. : Entomological Society of America. A remote-insect detection system was designed, constructed, and operated in typical southern Texas environments near fields of corn and cotton. The system electronically detected *Heliothis zea* (Boddie) and *Heliothis virescens* (F.) and automatically radio-telemetered event

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information to a programmed data processor (computer). Remote infrared moth detector units were installed in the field and baited with species-specific pheromone lures. A tone-coded radio frequency pulse was transmitted from the detector units when moths that responded to respective lures were detected. Numbers of moths detected were automatically collated by the computer each night at hourly intervals. The infrared detectors, associated control circuits, and radio transmitters were reliable in adverse weather conditions. The system was at least 92% accurate in counting the moths detected and was 100% accurate in reporting the detection of single moths as a first event each night. Detector-transmitter units within a field consumed a nominal 6 mW from a 6-V lantern battery that lasted about 11 mo. Journal of economic entomology. Apr 1989. v. 82 (2). p. 675-684. Includes references. (NAL Call No.: DNAL 421 J822).

0517

Development of open-pollinated varieties, non-conventional hybrids and inbred lines of tropical maize with resistance to fall armyworm, *Spodoptera frugiperda* (Lepidoptera: Noctuidae), at CIMMYT. FETMA. Mihm, J.A. Smith, M.E.; Deutsch, J.A. Gainesville, Fla. : Florida Entomological Society. Florida entomologist. Paper presented at the "Fall Armyworm Symposium", 1988. Sept 1988. v. 71 (3). p. 262-268. Includes references. (NAL Call No.: DNAL 420 F662).

0518

Development of the southwestern corn borer, *Diatraea grandiosella* Dyar, on corn and johnsongrass. SENTD. Aslam, M. Whitworth, R.J. College Station, Tex. : Southwestern Entomological Society. The Southwestern entomologist. Sept 1988. v. 13 (3). p. 191-197. Includes references. (NAL Call No.: DNAL QL461.S65).

0519

*Diabrotica virgifera virgifera* esterase-m characterization using monoclonal antibodies. PNDAAZ. Altenhofen, D.G. Gabrielson, D.A.; McDonald, I.C. Grand Forks, N.D. : The Academy. Proceedings of the North Dakota Academy of Science. Apr 1990. v. 44. p. 51. Includes references. (NAL Call No.: DNAL 500 N813).

0520

Direct evaluation of natural enemies of the southwestern corn borer (Lepidoptera: Pyralidae) in Texas corn. EVETEX. Knutson, A.E. Gilstrap, F.E. Lanham, Md. : Entomological Society of America. The effect of natural enemies on survival of southwestern corn borer, *Diatraea grandiosella*

(Dyar), eggs and larvae was measured in Texas High Plains corn using exclusion cages. *Orius insidiosus* (Say) and spiders were the most abundant predators on corn plants. Predation of corn borer eggs was uncommon and insignificant. Survival of first-generation larvae in whorl stage corn where predators were excluded was significantly greater than survival on plants accessible to predators in two of three years. Survival of second-generation larvae on tassel stage corn was significantly greater during both years on caged plants (excluding predators). However, during the second generation, mortality of first and second instars was replaceable by cannibalism among mature, pre-diapause larvae. Egg and larval parasites were not observed. Environmental entomology. Aug 1989. v. 18 (4). p. 732-739. Includes references. (NAL Call No.: DNAL QL461.E532).

0521

Discovery of an entomophthoralean fungus (Zygomycetes: Entomophthorales) infecting adult northern corn rootworm, *Diabrotica barberi* (Coleoptera: Chrysomelidae). JIVPA. Naranjo, S.E. Steinkraus, D.C. Duluth, Minn. : Academic Press. Journal of invertebrate pathology. May 1988. v. 51 (3). p. 298-300. ill. (NAL Call No.: DNAL 421 J826).

0522

Dispersal and survival of early instars of European corn borer (Lepidoptera: Pyralidae) in field corn. JEENAI. Ross, S.E. Ostlie, K.R. Lanham, Md. : Entomological Society of America. Cohorts of European corn borer, *Ostrinia nubilalis* (Hubner), from eggs infested on whorl-stage corn (*Zea mays* L.), were intensively sampled through fourth instar in 1986 and through fifth instar in 1987. In both years, central plants in plots (4 by 2 m, 55 plants) were infested with European corn borer egg masses to simulate a first-generation infestation. In 1986, one egg mass was placed in each plot, whereas in 1987, plots received one, two, or four egg masses. In both years, >50% of the recovered larvae were on the infested plant. Mean dispersal distance increased linearly with time in both years. However, maximum dispersal distance was independent of time in both years. In 1987, egg mass density had a significant linear effect on maximum dispersal distance but no effect on mean dispersal distance. The radius encompassing 90% of the recovered larvae included the infested plant and two plants on either side within the same row. Mortality occurred mainly within the first 48 h: 75.7% in 1986 and 82.9% in 1987. A logistic regression showed that egg and larval survival were independent of egg mass density. The number of tunnels produced per larva found at 8 d after infestation (considered equivalent to scouting) was 0.592. Knowledge of European corn borer dispersal and survival could be used to improve sampling plans and the calculation of economic thresholds. Journal of economic entomology.

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June 1990. v. 83 (3). p. 831-836. Includes references. (NAL Call No.: DNAL 421 J822).

0523

### Distribution and sampling of southwestern corn borer (Lepidoptera: Pyralidae) in preharvest corn.

JEENAI. Overholt, W.A. Knutson, A.E.; Smith, J.W. Jr.; Gilstrap, F.E. Lanham, Md. : Entomological Society of America. Southwestern corn borer, *Diatraea grandiosella* Dyar, was sampled from six corn, *Zea mays* (L.), fields in the Texas High Plains during 1985, 1986, and 1987. Density estimates were made for eggs, small, medium, and large-sized larvae and pupae during both corn bc ^ generations. Taylor's power function pro ^ significant regressions for all size categories. The distribution of southwestern corn b ^ eggs and small larvae was aggregated, and ^ stages were progressively less . d. Binomial and sequential sampling plans for eggs and small larvae were developed using Taylor's coefficients. Journal of economic entomology. Aug 1990. v. 83 (4). p. 1370-1375. Includes references. (NAL Call No.: DNAL 421 J822).

0524

### Distribution of parasitism by *Macrocentrus grandii* (Hymenoptera: Braconidae) in maize infested by *Ostrinia nubilalis* (Lepidoptera: Pyralidae).

EVETEX. Onstad, D.W. Siegel, J.P.; Maddox, J.V. Lanham, Md. : Entomological Society of America. *Macrocentrus grandii* Goidanich is a braconid parasitoid of the European corn borer, *Ostrinia nubilalis* (Hubner). Over a 3-yr period, we collected corn borer larvae from maize fields in Illinois to determine how host density and other factors influence the distribution of parasitism. The proportion of parasitized larvae was not density dependent at the single-stalk and field scales. Parasitism was always higher in the first generation of the bivoltine population. Proportion of parasitized larvae was correlated with the proportion of stalks that had at least one parasitized larva and with the frequency of infested stalks. These correlations indicated that searching and oviposition by the female parasitoid may be random among maize stalks. The apparent inefficiency of this parasitoid is discussed. Environmental entomology. Feb 1991. v. 20 (1). p. 156-159. Includes references. (NAL Call No.: DNAL QL461.E532).

0525

### Distribution of the stalk borer *Paraipema nebris* (Lepidoptera: Noctuidae) in no-till corn.

JESCEP. Highland, H.B. Roberts, J.E. Sr. Tifton, Ga. : Georgia Entomological Society. Journal of entomological science. Oct 1989. v. 24 (4). p. 428-436. maps. Includes references. (NAL Call No.: DNAL QL461.G4).

0526

### Distributions among S1 lines for European corn borer (Lepidoptera: Pyralidae) and stalk rot resistance ratings in two maize synthetics improved by recurrent selection.

JEENAI. Nyhus, K.A. Russell, W.A.; Guthrie, W.D. Lanham, Md. : Entomological Society of America. Four cycles of recurrent selection were used to reduce leaf-feeding damage caused by first-generation European corn borer (ECB), *Ostrinia nubilalis* Hubner, and pith decay associated with *Diplodia*, *Diplodia maydis* (Berkeley) Saccardo, stalk rot (DSR) in two maize, *Zea mays* L., synthetics, BSAA and BSBB. Recurrent selection was based on the evaluation of S(1) progenies. For this study, 100 unselected S(1) lines from each of the original (C0) and improved (C4) populations of BSAA and BSBB were evaluated for ECB resistance, DSR resistance, and stalk rind puncture. The distributions of S(1) lines for the three traits and the genetic relationships among traits were evaluated to determine the effectiveness of the recurrent selection programs. The C4s of both synthetics were more resistant than the C0s to ECB leaf feeding after artificial infestations, were more resistant to DSR after artificial inoculations, and possessed harder stalks. The differences between the C0 and C4 means were highly significant (P less than 0.01) in all instances. Reductions in genetic variation were observed in BSAA for ECB ratings and in BSBB for all three traits. The reductions in genetic variation were especially dramatic for ECB ratings, indicating that relatively few gene pairs were segregating for leaf-feeding resistance in BSAA and BSBB. Low and generally nonsignificant correlations between DSR ratings and rind puncture readings indicated that selection for both traits would be justified to improve field stalk lodging resistance. Journal of economic entomology. Feb 1989. v. 82 (1). p. 239-245. Includes references. (NAL Call No.: DNAL 421 J822).

0527

### Diurnal abundance and spatial distribution of armyworm, (Lepidoptera: Noctuidae) in no-till corn.

JESCEP. Laub, C.A. Luna, J.M. Tifton, Ga. : Georgia Entomological Society. Journal of entomological science. Apr 1991. v. 26 (2). p. 261-266. Includes references. (NAL Call No.: DNAL QL461.G4).

0528

### Diversion of oviposition by *Atherigona soccata* (Diptera: Muscidae) to nonhost maize with sorghum seedling extract.

EVETEX. Unnithan, G.C. Saxena, K.N. Lanham, Md. : Entomological Society of America. Environmental entomology. Oct 1990. v. 19 (5). p. 1432-1437. Includes references. (NAL Call No.: DNAL QL461.E532).

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0529

Dry cucurbitacin-containing baits for controlling adult western corn rootworms, *Diabrotica virgifera virgifera* (Coleoptera: Chrysomelidae), in field corn.  
Levine, E. Oloumi-Sadeghi, H.; Metcalf, R.L.; Lampman, R. College Park, Md. : Department of Horticulture, University of Maryland. Report: Cucurbit genetics cooperative. July 1988. (11). p. 79-82. Includes references. (NAL Call No.: DNAL SB337.C94).

0530

### Early-season corn pests.

Shields, E.J. Batavia, N.Y. : Agricultural Div. of Coop Extension, Four Western Plain Counties, N.Y. State. Ag impact. Apr 1990. v. 17 (4). p. 2, 6, 8. (NAL Call No.: DNAL S544.3.N7A45).

0531

Economic injury level for the banks grass mite (Acari: Tetranychidae) on corn.  
JEENAI. Archer, T.L. Bynum, E.D. Jr. Lanham, Md. : Entomological Society of America. Banks grass mite, *Oligonychus pratensis* (Banks), feeding on corn, *Zea mays* L., between the late-vegetative and dent growth stages caused significant yield loss but did not affect test weights. Regression analysis was used to compare several independent variables (mite abundance, damage ratings, and percentage of the leaves infested) with yield loss and plant lodging. Data were analyzed the week of maximum yield loss from mite feeding at predetermined damage levels and the week before this event. The best relationship was between yield reduction and percentage of the leaves infested the week before maximum yield loss from mite feeding occurred. There was a 0.2% yield loss per 1% infested leaves per plant. A flexible economic threshold for Banks grass mite on corn can now be calculated based on crop value and cost of control. Mite feeding on corn in the dent growth stage did not affect yield. Banks grass mite feeding did not have a definitive effect on incidence of plant lodging, although there were indications that increased lodging may have been associated with mite feeding in some situations. Grain moisture declined as densities and feeding damage by Banks grass mite increased. Journal of economic entomology. June 1990. v. 83 (3). p. 1069-1073. Includes references. (NAL Call No.: DNAL 421 J822).

0532

Effect of conservation tillage on European corn borer (Lepidoptera: Pyralidae) populations.  
EVETEX. Berry, E.C. Ghidiu, G.M. Lanham, Md. : Entomological Society of America. The influence of four tillage systems and two crop rotations on populations of first- and second-generation European corn borer, *Ostrinia nubilalis* (Hubner), was determined. In six of the eight years, populations of European corn borer were

influenced by either crop rotation or tillage. It is suspected that population dynamics were directly affected by crop maturity at time of egg deposition and early larval establishment and development. Environmental entomology. Dec 1989. v. 18 (6). p. 917-920. Includes references. (NAL Call No.: DNAL QL461.E532).

0533

### Effect of constitutive and herbivore-induced extractables from susceptible and resistant soybean foliage on nonpest and pest noctuid caterpillars.

JEENAI. Wheeler, G.S. Slansky, F. Jr. Lanham, Md. : Entomological Society of America. Soybean foliage from susceptible ('Bragg') and resistant (PI 229358 and D75-10169) lines was extracted in several nonpolar and polar organic solvents to assess constitutive (mite-free) and induced (mite-damaged) activity against nonpest and pest noctuid caterpillars. The benzene fraction, incorporated in artificial diet, contained most of the constitutive activity of both the resistant and susceptible lines, as indicated by reduced relative growth rate (RGR) of velvetbean caterpillar, *Anticarsia gemmatalis* Hubner; corn earworm, *Helicoverpa* (= *Heliothis*) *zea* (Boddie); tobacco budworm, *H. virescens* (F.); and fall armyworm, *Spodoptera frugiperda* (J. E. Smith) compared with larvae fed the extract- and solvent-free control diet. Induced activity from mite-damaged greenhouse-grown plants and *A. gemmatalis*-damaged field-grown plants was detected primarily in the petroleum ether fraction. Among the species tested on the induced fractions (*A. gemmatalis*, *S. frugiperda*, and the cabbage looper, *Trichoplusia ni* (Hubner)), *S. frugiperda* was the most sensitive species, as demonstrated by reduced RGR. Overall, among the species (*H. zea*, *H. virescens*, and *T. ni*) more tolerant of the soybean foliage fractions, only *H. zea* is a major soybean foliage pest. Surprisingly, among the two most sensitive species, *A. gemmatalis* is a legume specialist and major soybean pest, whereas *S. frugiperda* is a polyphagous species but not a soybean pest. These results suggest that presumed soybean-adapted species may not be more resistant than soybean-naive species to the deleterious effects of soybean foliage extracts. Journal of economic entomology. June 1991. v. 84 (3). p. 1068-1079. Includes references. (NAL Call No.: DNAL 421 J822).

0534

### Effect of early season temperatures on development of western corn rootworm immatures in No-till ridge and conventional tillage systems (Coleoptera:Chrysomelidae).

JKESA. Gustin, R.D. Lawrence, Kan. : The Society. Journal of the Kansas Entomological Society. July 1989. v. 62 (3). p. 348-352. Includes references. (NAL Call No.: DNAL 420 K13).

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0535

**Effect of incorporation on the efficacy of selected pyrethroids for control of black cutworm (Lepidoptera: Noctuidae).**  
JEENAI. Foster, D.E. Showers, W.B.; Hendrix, W.H. III; Wintersteen, W.K.; Bing, J.W. Lanham, Md. : Entomological Society of America.  
Laboratory-reared black cutworm, *Agrotis ipsilon*(Hufnagel), larvae were used to determine if incorporating fenvalerate and permethrin in the soil to a depth of 8 cm would alter efficacy. Laboratory bioassays were done 0, 7, 14, and 21 d after application. Results of second- and fourth-instar bioassays show that secondinstars are more sensitive to fenvalerate and permethrin but require 89% more handling time than fourth instars. Incorporation significantly reduced the efficacy of fenvalerate and permethrin. Decreased efficacy from incorporating permethrin was countered by increasing the application rate from 0.113 kg(AI)/ha to 0.226 kg(AI)/ha, the maximum labeled rate. Incorporation of fenvalerate reduced efficacy to an unacceptable level even at the maximum labeled rate. Limited data suggest that incorporation also affects cyfluthrin and desfenvalerate adversely. Journal of economic entomology. Oct 1990. v. 83 (5). p. 2073-2077. Includes references. (NAL Call No.: DNAL 421 J822).

0536

**Effect of insecticide treatments on root damage ratings of maize in controlled infestations of western corn rootworms (Coleoptera: Chrysomelidae).**

JEENAI. Sutter, G.R. Branson, T.F.; Fisher, J.R.; Elliott, N.C.; Jackson, J.J. Lanham, Md. : Entomological Society of America. During a 5-syr study, recommended rates of soil insecticides were applied at planting time to plots of maize, *Zea mays* L., located on uniform soil. Plots were infested with known populations of eggs of western corn rootworm, *Diabrotica virgifera virgifera* LeConte, to determine the degree to which insecticides protected roots from larval attack. Moisture in the upper 10 cm of soil and precipitation were recorded each year. In the last two years of the study, we used laboratory soil bioassays to establish larvicidal activity for each insecticide application. Our results indicated that larval feeding damage for each egg density was consistent in the untreated plots every year except 1984, when excessive rainfall that coincided with egg hatch apparently prevented larval establishment. Root protection provided by insecticide treatments was highly variable. Significant interactions that occurred between rootworm infestation rate, year, and insecticide treatments suggested that the level of root protection provided by insecticides was dependent on year (edaphic and environmental factors) and pest population density. The laboratory bioassays indicated dramatic differences in persistence of some insecticide treatments applied when maize was planted. Journal of economic entomology. Dec 1989. v. 82 (6). p. 1792-1798. Includes references. (NAL Call No.: DNAL 421 J822).

0537

**Effect of insecticide treatments on root lodging and yields of maize in controlled infestations of western corn rootworms (Coleoptera: Chrysomelidae).**  
JEENAI. Sutter, G.R. Fisher, J.R.; Elliott, N.C.; Branson, T.F. Lanham, Md. : Entomological Society of America. Granular soil insecticides were applied at planting time to plots of maize (*Zea mays* L.) infested with known populations of eggs of western corn rootworm, *Diabrotica virgifera virgifera* LeConte, to determine how treatments protected plants from root lodging and yield loss caused by larval feeding. The percentage of lodged plants increased significantly with increases in egg density. Percentage lodging in untreated plots also differed significantly between years, and there was a significant year-by-egg density interaction. Insecticides significantly reduced root lodging, but lodging in carbofuran-treated plots was greater than in all other treatments. Percentage yield loss caused by larval feeding was consistent each year for each egg density, and yield loss was significantly greater in plots infested with higher egg densities. Terbufos and isofenphos were not consistent in preventing yield loss; these insecticides caused a significant year-by-treatment interaction. As main effects, yield protection by insecticides was consistent each year, and the insecticides did not differ in their ability to protect yield. Yields in treated plots infested with 300 and 600 eggs per 0.3 m of row did not differ significantly from untreated plots; however, yields in treated plots infested with 1,200 and 2,400 eggs per 0.3 m of row were significantly higher when insecticides were used. Correlations between root damage ratings and yields of untreated plants were highly significant. For insecticide-treated plots, root damage ratings were not significantly correlated with yield, which suggests that root damage ratings are poor criteria for evaluating insecticide efficacy. Journal of economic entomology. Dec 1990. v. 83 (6). p. 2414-2420. Includes references. (NAL Call No.: DNAL 421 J822).

0538

**Effect of larval density and cannibalism on growth and development of the Southwestern corn borer, *Diatraea grandiosella*, and the European corn borer, *Ostrinia nubilalis* (Lepidoptera: pyralidae).**

JKESA. Breden, F. Chippendale, G.M. Lawrence, Kan. : The Society. Journal of the Kansas Entomological Society. July 1989. v. 62 (3). p. 307-315. Includes references. (NAL Call No.: DNAL 420 K13).

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0539

**Effect of light exposure and carbohydrate content of snap bean leaves on Chinese rose beetle (Coleoptera: Scarabaeidae) feeding.**  
JEENAI. Furutani, S.C. Arita, L.H. Lanham, Md. : Entomological Society of America. Chinese rose beetle, *Adoretus sinicus* Burmeister, preferred to feed on snap bean, *Phaseolus vulgaris* L., leaves that were grown under ambient sunlight conditions compared with leaves from plants that had been placed in 24 h darkness before feeding trials. Carbohydrate content in the leaves of plants grown in sunlight was significantly higher than that of leaves from plants that had been exposed to 24 h of darkness. Application of exogenous carbohydrates to leaf explants from plants exposed to 24 h darkness resulted in significantly more feeding on these explants compared with controls (plants grown under ambient sunlight). The results suggest that the amount of available carbohydrate content in leaves is involved in the selection of feeding material by the Chinese rose beetle. Journal of economic entomology. Oct 1990. v. 83 (5). p. 2022-2025. Includes references. (NAL Call No.: DNAL 421 J822).

0540

**Effect of plant lectins on the larval development of European corn borer (Lepidoptera: Pyralidae) and southern corn rootworm (Coleoptera: chrysomelidae).**  
JEENAI. Czapla, T.H. Lang, B.A. Lanham, Md. : Entomological Society of America. Twenty-six plant lectins were tested for antiinsect properties against neonate European corn borer, *Ostrinia nubilalis* (Hubner), and Southern corn rootworm, *Diabrotica undecimpunctata howardi* Barber, larvae. Lectins from wheat, *Triticum vulgaris* L., castor beans, *Ricinus communis* L., and camels foot tree, *Bauhinia purpurea* L., were lethal to neonate *O. nubilalis* larvae when applied topically to the diet surface as a 2% solution. The LC<sub>50</sub>'s for lectins from *R. communis*, *T. vulgare*, and *B. purpurea* incorporated into the artificial diet were 0.29, 0.59, and 0.73 mg/g of diet, respectively. Surviving larvae had a 50% weight loss compared with control larvae at these concentrations. No other lectins affected larval growth or mortality of *O. nubilalis*. Lectins from *R. communis*, pokeweed (*Phytolacca americana* L.), and green marine algae, *Codium fragile* (Suringar), were toxic to neonate *D. undecimpunctata howardi* larvae when applied topically (2%) to the artificial diet. Several other lectins inhibited larval growth by > 40% compared with the control. These lectins were from jackfruit, *Artocarpus integrifolia* Lamarck, hairy vetch, *Vicia villosa* Roth, osage orange, *Maclura pomifera* Rafinesque, *Bandeiraea simplicifolia* (Baillon), and *T. vulgaris*. Transformation of the genes coding these lectins could be beneficial in the development of insect resistance in important agronomical crops. Journal of economic entomology. Dec 1990. v. 83 (6). p. 2480-2485. Includes references. (NAL Call No.: DNAL 421 J822).

0541

**Effect of population density of immatures on survival and development of the western corn rootworm (Coleoptera: Chrysomelidae).**  
JESCEP. Elliott, N.C. Sutter, G.R.; Branson, T.F.; Fisher, J.R. Tifton, Ga. : Georgia Entomological Society. Journal of entomological science. Apr 1989. v. 24 (2). p. 209-213. Includes references. (NAL Call No.: DNAL QL461.G4).

0542

**Effect of research on commercial hybrid maize resistance to European corn borer (Lepidoptera: Pyralidae).**  
JEENAI. Barry, D. Darrah, L.L. Lanham, Md. : Entomological Society of America. Economic loss caused by the European corn borer, *Ostrinia nubilalis* (Hubner), amounts to millions of dollars per year. Maize breeding programs funded from public and private sources have developed and released germplasm with resistance to European corn borer whorl leaf feeding and, to a lesser extent, sheath and sheath collar feeding during flowering. A 4-yr study of 100 hybrids each year was undertaken to evaluate levels of resistance to European corn borer available to the farmer in commercial hybrids. About 90% of the maize hybrids evaluated have some resistance to whorl leaf feeding and about 75% have some resistance to sheath and sheath collar feeding. In approximately two-thirds of the hybrids evaluated in Missouri, the resistance levels could be further enhanced and susceptible hybrids improved with the introduction of additional genes for resistance. Journal of economic entomology. June 1991. v. 84 (3). p. 1053-1059. Includes references. (NAL Call No.: DNAL 421 J822).

0543

**Effectiveness and residual effects of seven insecticides on *Dalbulus maidis* (Homoptera: Cicadellidae) and *Peregrinus maidis* (Homoptera: Delphacidae).**  
JESCEP. Tsai, J.H. Steinberg, B.; Falk, B.W. Tifton, Ga. : Georgia Entomological Society. Journal of entomological science. Jan 1990. v. 25 (1). p. 106-111. Includes references. (NAL Call No.: DNAL QL461.G4).

0544

**Effects of a resistant maize genotype and cytoplasmic polyhedrosis virus on growth and development of the corn earworm (Lepidoptera: Noctuidae).**  
EVETEX. Bong, C.F.J. Sikorowski, P.P.; Davis, F.M. Lanham, Md. : Entomological Society of America. The effects of a maize, *Zea mays* L., genotype, 'Zapalote chico' 2451-P(C3), resistant to the corn earworm, *Helicoverpa zea* (Boddie), alone and in combination with cytoplasmic polyhedrosis virus (CPV) on the

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growth and development of corn earworm were investigated. Corn earworm fed 'Zapalote Chico' silks incorporated into a laboratory diet were significantly smaller, had higher mortality, and required longer to complete each developmental stage when compared to those on control diet. CPV significantly reduced corn earworm larval and adult weights, prolonged larval developmental period, and adversely affected percentages of pupation and adult emergence. 'Zapalote Chico' and CPV interacted synergistically with respect to pupal and adult weights and antagonistically with respect to larval weight. Nevertheless, adults from treatment combinations of CPV and silk weighed up to 41% less than those of control diet. 'Zapalote Chico' and CPV were independent in action with respect to percent larval survival, percent pupation and percent adult emergence of corn earworm. The effects of silk and CPV on developmental times were most severe for the larval stage. Larval period was prolonged 5.3 d when larvae were fed 'Zapalote Chico' alone; but, in combination with CPV (which increased larval period by 1.6 d), duration of larval stage was synergistically prolonged 10.8 d (mean larval period, 23.8 d) when compared to that of the control diet. Pupal period in the treatment with combined silk and CPV was 13.2 d, which was significantly longer than the 11.8 d on control diet. The mean developmental period from neonate to adult for corn earworm fed silk was 30.3 d; but it synergistically increased to 37.4 d when CPV was given together with 'Zapalote Chico', as compared to 24.8 d in the control. The potential use of maize resistance and CPV in the integrated pest management of corn earworm is discussed. Environmental entomology. Aug 1991. v. 20 (4). p. 1200-1206. Includes references. (NAL Call No.: DNAL QL461.E532).

### 0545

**Effects of alternative host plants on longevity, oviposition, and emergence of western and northern corn rootworms (Coleoptera: Chrysomelidae).**  
EVETEX. Siegfried, B.D. Mullin, C.A. Lanham, Md. : Entomological Society of America. The longevity of adult female western corn rootworms, *Diabrotica virgifera virgifera* LeConte, maintained on diets of squash blossoms, sunflower ray florets or inflorescences, and goldenrod inflorescences was significantly reduced compared with beetles maintained on corn ears. However, beetles survived for extended periods on these diets and produced viable eggs. Oviposition rates were inversely proportional to adult longevity so that total oviposition was largely unaffected by diet. By contrast, adult female northern corn rootworms, *Diabrotica barberi* Smith & Lawrence, showed only minor differences in longevity on the alternative diets. Adult emergence of both species from corn plots previously interplanted with corn, squash, or sunflower in close proximity was similarly distributed among the three parental foods, demonstrating that considerable oviposition occurs where larvae that specialize in corn cannot feed. When emergence was monitored at

least 4.5 m away from adjacent host species, significantly more adults emerged from areas previously planted in corn. These results indicate that oviposition near larval food might be directed more by long-range volatiles from corn than by visual or physical attributes of plants within sites. Choice of ovipositional sites and adult foods represents clearly distinct behaviors in female rootworms, and western corn rootworm, in particular, will lay eggs in sites where feeding reduces fitness. Environmental entomology. June 1990. v. 19 (3). p. 474-480. illl. Includes references. (NAL Call No.: DNAL QL461.E532).

### 0546

**Effects of bacterial contamination on gamma-irradiated and nonirradiated corn earworm (Lepidoptera: Noctuidae).**  
JEENAI. Sikorowski, P.P. Lawrence, A.M. Lanham, Md. : Entomological Society of America. Seven-day-old larvae of *Helicoverpa zea* (Boddie) were gamma-irradiated with 5.0 or 7.5 krad and subsequently reared on bacteria-free or bacteria-contaminated diet. Bacterial contamination adversely affected almost all parameters tested including larval mortality, pupal weights, larval and pupal deformities, egg production, and egg hatch. Life span and mating competitiveness of survivors were not affected by bacterial contamination. Production losses of *H. zea* due to bacterial contamination varied with bacterial species. *Pseudomonas maltophilia* Hugh & Ryschenkow and *Bacillus subtilis* (Ehrenberg) Cohn caused the highest losses, and *Escherichia coli* (Migula) Castellani & Chalmers and *Leuconostoc mesenteroides* (Tsenkovskii) vari Tieghem caused the lowest losses. Mortality and reduced fecundity due to irradiation were additive to mortality and reduced fecundity caused by bacteria, but interaction between bacteria and irradiation was not significant in any of the tests. Journal of economic entomology. Oct 1991. v. 84 (5). p. 1441-1447. Includes references. (NAL Call No.: DNAL 421 J822).

### 0547

**Effects of constant and fluctuating temperatures on developmental rates and demographic statistics for the corn leaf aphid (Homoptera: Aphididae).**  
JEENAI. Elliott, N.C. Kieckhefer, R.W.; Walgenbach, D.D. College Park, Md. : Entomological Society of America. Relationships between temperature and developmental rate of immature apterous and alate corn leaf aphids, *Rhopalosiphum maidis* (Fitch), were studied in the laboratory at constant and fluctuating temperatures. Estimates of lower (6.1°C) and upper (26.3°C) thresholds for development were determined from studies done at constant temperatures. Developmental rates were determined and demographic statistics estimated for cohorts of corn leaf aphids exposed to fluctuating temperature regimes that simulated average and extreme low and high temperature conditions during late spring in eastern South

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Dakota. For cohorts exposed to fluctuating temperatures, degree-day (DD) summations using lower and upper developmental thresholds were consistent with expected DD requirements derived from constant temperature studies of development. Demographic statistics expressed on a DD time scale differed among cohorts of apterous and alate corn leaf aphids exposed to identical temperature regimes. For each temperature regime, the intrinsic rate of increase of apterae exceeded that of alatae. However, temperature had a negligible effect on potential population growth rates of either morph. Stable instar distributions for apterous corn leaf aphid cohorts were only slightly affected by temperature; approximately 57, 19, 10, 6, and 8% of each cohort were first, second, third, and fourth instars and adults, respectively. Journal of economic entomology. Oct 1988. v. 81 (5). p. 1383-1389. Includes references. (NAL Call No.: DNAL 421 J822).

0548

**Effects of cytoplasmic polyhedrosis virus and bacterial contamination on growth and development of the corn earworm, *Helicoverpa zea* (Lepidoptera: Noctuidae).**  
JIVPA. Bong, C.F.J. Sikorowski, P.P. Duluth, Minn. : Academic Press. Bacterial contaminants, singly and in combination with cytoplasmic polyhedrosis virus (CPV), significantly influenced the growth and development of corn earworm, *Helicoverpa* (=*Heliothis*) *zea*. Among the four bacteria species studied, the most virulent was *Pseudomonas maltophilia*, followed by *Bacillus subtilis*, *Escherichia coli*, and *Staphylococcus epidermidis*. *P. maltophilia* caused severe losses in all stages of *H. zea*, with the larval stage being the most susceptible which led to more than a 60% loss in adult emergence. *B. subtilis* was the most virulent in the pupal stage and caused a 40% loss in adult emergence. *E. coli* did not significantly affect the survival of *H. zea*, but pupae and adults from contaminated larvae were smaller than those in the control. In all bacteria except *S. epidermidis*, the resulting *H. zea* adults were 25 to 114 mg smaller than the noncontaminated ones. The CPV did not affect survival of *H. zea*, but infected larvae and adults were smaller than those in the control. When combined with bacteria, CPV acted synergistically in some cases to further adversely affect growth and development of *H. zea*. Journal of invertebrate pathology. May 1991. v. 57 (3). p. 406-412. Includes references. (NAL Call No.: DNAL 421 J826).

0549

**Effects of European corn borer (Lepidoptera: Pyralidae) tunneling and drought stress on field corn gas exchange parameters.**  
JEENAI. Godfrey, L.D. Holtzer, T.O.; Norman, J.M. Lanham, Md. : Entomological Society of America. The influence of European corn borer, *Ostrinia nubilalis* (Hubner), larval tunneling on corn (*Zea mays* L.) gas exchange parameters was examined in a 2-yr field study. Manual

larval infestations were established in corn (two planting dates per year) grown on a soil moisture gradient. Larval tunneling significantly reduced the corn photosynthetic rate compared with uninfested plants by 11.4 and 22.1% in 1987 for 3 and 5 larvae per plant infestations, respectively, whereas the 1 larva per plant infestation significantly increased the photosynthetic rate. In 1988, when the drought stress was not as severe as in 1987, only the high infestation rate affected the photosynthetic rate (an 11.7% reduction). Other consequences of larval tunneling were reduced stomatal conductance (up to 28.1%), decreased intercellular CO<sub>2</sub> concentration, and increased leaf temperature (up to 1.8 degrees C). The interactions with soil moisture level were not significant. In all four planting dates, once the larval tunneling ceased, i.e., pupation occurred, the effect on photosynthetic rate waned, even though the vascular obstruction (tunnel) was still present. The plants appeared to have some mechanism to compensate for the injury. These results suggest that European corn borer tunneling directly affected plant physiology, possibly through disturbing the source-sink relationship (upper photosynthesizing leaves-developing ear). Compared with adequately watered soils, water deficit conditions resulted in reduced photosynthetic rates, stomatal conductances, and intercellular CO<sub>2</sub> concentrations (1988 only), and in increased leaf temperatures; however, the effects were not transient as were the effects from the larval tunneling. Journal of economic entomology. Aug 1991. v. 84 (4). p. 1370-1380. Includes references. (NAL Call No.: DNAL 421 J822).

0550

**The effects of prebioassay treatment of resistant and susceptible corn silks on the development of the corn earworm and fall armyworm.**

Wiseman, B.R. Isenhour, D.J. Clemson, S.C. : South Carolina Entomological Society. Journal of agricultural entomology. Oct 1988. v. 5 (4). p. 247-251. Includes references. (NAL Call No.: DNAL SB599.J69).

0551

**Effects of resistant maize silks on corn earworm (Lepidoptera: Noctuidae) biology: a laboratory study.**

JEENAI. Wiseman, B.R. Isenhour, D.J. Lanham, Md. : Entomological Society of America. Results of a laboratory study show that even low levels of resistant maize, *Zea mays* L., silks reduced corn earworm, *Heliothis zea* (Boddie), growth and extended the life cycle by about 3 d. An intermediate level of resistance in maize silks reduced corn earworm growth, extended developmental time by about 8 d per generation, and subsequently reduced egg production by approximately 30%. A high level of resistance in maize silks reduced corn earworm growth, extended the life cycle by about 20 d, and reduced egg production by about 65% per

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generation. In addition to these parameters, if corn earworm attacked maize each generation, the intermediate level of this type of resistance would eliminate about two generations per year and the high level of resistance 40-50% of the generations per year. Thus, if hybrid maize can be developed with intermediate to high levels of resistance to corn earworm, then populations that usually devastate alternate crops can be dramatically reduced while reducing pesticide use by growers. Journal of economic entomology. Apr 1990. v. 83 (2). p. 614-617. Includes references. (NAL Call No.: DNAL 421 J822).

### 0552

**Effects of simulated acidic precipitation on plant-insect interactions in agricultural systems: corn and black cutworm larvae.**  
JEVQAA. Stinner, D.H. Stinner, B.R.; McCartney, D.A. Madison, Wis. : American Society of Agronomy. Effects of simulated acidic precipitation on food utilization, growth, development, and herbivory of black cutworms (*Agrotis ipsilon*) on corn (*Zea mays L.*) in the most economically important life-history combinations of plant and insect were investigated in a series of laboratory and greenhouse experiments. A nutritional-index technique was used in petri-dish experiments with fourth, fifth, and sixth instar black cutworms to determine if acid precipitation could affect the amount of food consumed via affects on insect physiological parameters. Larvae were fed corn plants that were watered two times weekly with simulated precipitation (pH 2.8, 4.2, and 5.6) until the larvae pupated (total deposition of 8-10 cm of precipitation). The inverse relationship between the index of approximate digestibility (AD), which was higher in the pH 2.8 and 5.6 treatments, and the efficiency of conversion of digested food indices (ECD), which was lowest in the pH 2.8 treatment, suggested a stress effect of high acidity. A series of six greenhouse pot experiments was conducted to assess effects of acid precipitation on black cutworms and their interactions with growing corn plants. Fourth, fifth, and sixth instar larvae were placed in pots containing soil and corn plants, which were initially in the first or second leaf stage, and simulated acid precipitation (pH 2.8, 4.2, and 5.6) was applied two times per week until the larvae pupated (8-16 cm total deposition). Significant treatment effects were observed in the sixth instar larvae on two-leaf corn experiment, where the larvae grew larger and developed faster in the pH 2.8 and 4.2 treatments than in the 5.6 treatment. Acid precipitation treatments did not significantly affect black cutworm damage to corn plants in any of these experiments. Journal of environmental quality. July/Sept 1988. v. 17 (3). p. 371-376. Includes references. (NAL Call No.: DNAL QH540.J6).

### 0553

**Effects of soil moisture, texture, and rate of soil drying on egg and larval survival of the southern corn rootworm (Coleoptera: Chrysomelidae).**

EVETEX. Brust, G.E. House, G.J. Lanham, Md. : Entomological Society of America. Greenhouse studies were conducted to determine the effects of four soil textures and four soil drying periods on southern corn rootworm, *Diabrotica undecimpunctata howardi* Barber, egg and larval survival and maturation. Soil drying intervals had the most detrimental effect on survival. After 4 d of soil drying (no water added to pots), only 20% of larvae survived to pupation. Low clay or organic matter and low levels of soil moisture were not conductive to survival of southern corn rootworm. The interaction of soil texture and soil drying indicates that at 4 d of soil drying, larval survival decreased (70%) in all soils, except dark-textured soils (35% decrease) compared with 2 d of soil drying. Low levels of soil moisture slowed developmental time of larvae. Eggs and first instars were the stages most negatively affected by moisture stress and different soil textures. However, in quartz-sand, the more mobile stages had low survival, probably because of cuticle abrasion from soil particles. The results of these experiments demonstrate the importance of considering the effects of rapidly drying soil on survival of southern corn rootworm and not simply the percentage of soil moisture at any one time. Environmental entomology. June 1990. v. 19 (3). p. 697-703. Includes references. (NAL Call No.: DNAL QL461.E532).

### 0554

**Effects of strip intercropping and no-tillage on some pest and beneficial invertebrates of corn in Ohio.**

EVETEX. Tonhasca, A. Jr. Stinner, B.R. Lanham, Md. : Entomological Society of America. We tested two agronomic practices that are likely to increase plant and structural diversity, no-tillage and strip intercropping, for effects on corn invertebrate fauna. Some of the most common herbivores and natural enemies were sampled by direct counts and damage estimation from 1988 through 1990 on monoculture corn and strips of corn alternated with soybean, under no-tillage and conventional tillage. Among soil pests, cut-worms (mostly the black cutworm, *Agrotis ipsilon* (Hufnagel)); armyworm, *Pseudaletia unipuncta* (Haworth); and slugs (*Gastropoda*) were more abundant in no-tillage plots, although only slugs caused severe damage. The western corn rootworm, *Diabrotica virgifera virgifera* LeConte, and the European corn borer, *Ostrinia nubitalis* (Hubner), were generally more abundant in conventional tillage plots. Despite crop rotation, the strip-intercropping system (four rows of each crop) was less effective in reducing western corn rootworm infestation, especially in conventional tillage plots. In 1990 only, ladybugs (mostly *Coleomegilla maculata* (DeGeer)) were more abundant in conventional tillage plots, whereas tarnished plant bugs,

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*Lygus lineolaris* (Palisot de Beauvois), were more abundant in no-tillage plots. Japanese beetle, *Popillia japonica* Newman; stink bugs, *Acrosternum hilare* (Say) and *Euschistus serous* (Say); and spiders (*Aranea*) were not significantly affected by treatments. Environmental entomology. Oct 1991. v. 20 (5). p. 1251-1258. Includes references. (NAL Call No.: DNAL QL461.E532).

0555

Effects of temperature and larval diet on development of the fall armyworm (Lepidoptera: Noctuidae). AESAAI. Ali, A. Luttrell, R.G.; Schneider, J.C. Lanham, Md. : The Society. Annals of the Entomological Society of America. July 1990. v. 83 (4). p. 725-733. Includes references. (NAL Call No.: DNAL 420 EN82).

0556

Effects of temperature on development of corn earworm (Lepidoptera: Noctuidae) on meridic diets of resistant and susceptible corn silks. EVETEX. Wiseman, B.R. Isenhour, D.J. Lanham, Md. : Entomological Society of America. Effects of interactions among temperature (20, 25, and 30 degrees C), known resistant and susceptible corn genotypes ('Zapalote Chico' and 'Stowell's Evergreen'), and concentrations of corn silk material-pinto bean diet mixture (0 and 18.75, 37.5 and 67.0 mg) on corn earworm, *Heliothis zea* (Boddie), growth ad developmental parameters were evaluated. Parameters measured were: 9-d larval weights, developmental time of larvae, weight of pupae, and days to adult eclosion. Corn earworm growth was slowest at 20 degrees C and fastest at 30 degrees C. Significant (P less than 0.05) differences caused by the resistant 'Zapalote Chico' compared with the susceptible 'Stowell's Evergreen' were measured consistently at 25 degrees C for all four developmental parameters. The median temperature (25 degrees C) appears to be optimum for detecting growth differences between resistant and susceptible plant materials regardless of silk concentration. Environmental entomology. Aug 1989. v. 18 (4). p. 683-686. Includes references. (NAL Call No.: DNAL QL461.E532).

0557

Effects of the onespotted stink bug (Hemiptera: Pentatomidae) on growth and yield of corn. JEENAI. Annan, I.B. Bergman, M.K. College Park, Md. : Entomological Society of America. Journal of economic entomology. Apr 1988. v. 81 (2). p. 649-653. Includes references. (NAL Call No.: DNAL 421 J822).

0558

Effects of threshing and drying on maize weevil populations in field-infested corn. JEENAI. Keever, D.W. Wiseman, B.R.; Widstrom, N.W. College Park, Md. : Entomological Society of America. Journal of economic entomology. Apr 1988. v. 81 (2). p. 727-730. Includes references. (NAL Call No.: DNAL 421 J822).

0559

Egg-hatching behavior of *Heliothis zea* and *H. virescens* (Lepidoptera: Noctuidae). JKESA. Adler, P.H. Dial, C.I. Lawrence, Kan. : The Society. Journal of the Kansas Entomological Society. July 1989. v. 62 (3). p. 413-416. ill. Includes references. (NAL Call No.: DNAL 420 K13).

0560

Emergence and radar-observed movement of *Heliothis zea* from senescent corn in East-Central Texas. BCOPB. Beerwinkle, K.R. Lopez, J.D.; Witz, J.A. Memphis, Tenn. : National Cotton Council and The Cotton Foundation. Proceedings - Beltwide Cotton Production Research Conferences. Conference held on January 3-8, 1988, New Orleans, Louisiana. 1988. p. 329-332. ill. Includes references. (NAL Call No.: DNAL SB249.N6).

0561

Emergence of the western and northern corn rootworms (Coleoptera: Chrysomelidae) from four tillage systems. JEENAI. Gray, M.E. Tollefson, J.J. College Park, Md. : Entomological Society of America. Emergence of the western corn rootworm (WCR), *Diabrotica virgifera virgifera* LeConte, and northern corn rootworm (NCR), *D. barberi* Smith and Lawrence, was evaluated in four tillage systems near Ames, Iowa, from 1983 through 1985. Linear regression equations ( $y = a + bx$ ) and coefficients of determination ( $R^2$ ) are presented that describe cumulative emergence ( $y$ ) (profit scale) on Julian date ( $x$ ) for both species in each tillage system. Initial emergence generally was delayed in conservation tillage treatments for the WCR. The rate of WCR emergence in these tillage systems was greater, however, than in more conventional practices. Because of increased rates of WCR emergence from conservation tillage practices, cumulative beetle emergence by mid-August through early September is comparable among tillage treatments despite delayed emergence associated with conservation practices. Emergence of NCR was less affected by tillage. Journal of economic entomology. Oct 1988. v. 81 (5). p. 1398-1403. Includes references. (NAL Call No.: DNAL 421 J822).

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0562

**Enhanced predation by Orius insidiosus (Hemiptera: Anthocoridae) on larvae of Heliothis zea and Spodoptera frugiperda (Lepidoptera: Noctuidae) caused by prey feeding on resistant corn genotypes.**

EVETEX. Isenhour, D.J., Wiseman, B.R.; Layton, R.C. Lanham, Md. : Entomological Society of America. Prey feeding on resistant versus susceptible corn genotypes was investigated for its effect on predation by *Orius insidiosus* (Say). Fall armyworm, *Spodoptera frugiperda* (J.E. Smith), that fed on fresh foliage of the resistant corn genotype 'MpSWCB-4' suffered significantly higher rates of predation by adult *O. insidiosus* (Say) than did armyworm fed 'Cacahuacintle,' a susceptible genotype. Similar results were obtained when corn earworm, *Heliothis zea* (Boddie), were fed a meridic diet containing silks from 'Zapalote Chico' compared with a diet without silks. A type II functional response was exhibited by *O. insidiosus* preying on fall armyworm but not on corn earworm. Feeding by corn earworm on meridic diets that contained resistant silks increased the age of the prey that were susceptible to attack by the predator. Environmental entomology. June 1989. v. 18 (3). p. 418-422. Includes references. (NAL Call No.: DNAL QL461.E532).

0563

**Entomopathogenic nematodes: host-finding ability in the presence of plant roots.**

EVETEX. Choo, H.Y., Kaya, H.K.; Burlando, T.M.; Gaugler, R. Lanham, Md. : Entomological Society of America. The host-finding ability of *Heterorhabditis heliothidis* (Khan, Brooks, and Hirschmann) and *Steinernema feltiae* Filipjev in the presence of plant roots in sandy soil was investigated. During a 7-d period, host-finding ability of *H. heliothidis* was not impaired when the dried root weights of corn, tomato, or marigold plants were <1.6 g or of *S. feltiae* when dried root weights were <3.6 g. For example, host mortality by *H. heliothidis* was 85% for controls (no roots) and 85% for corn roots (1.6 g); host mortality by *S. feltiae* was 21% for controls and 16% for corn roots (3.6 g). However, host mortalities between controls and corn roots for *H. heliothidis* during a 2-d period showed significant differences when root weights were >1.5 g. Thus, treatments with root weights >1.5 g had significantly lower host mortalities (range, 27-50%) compared with control treatments (range, 73-96%); treatments with root weights <1.2 g showed no significant difference (range, 79-80%) compared with control treatments (range, 82-85%). Linear regression suggested a relationship between root weight and host mortality. Increasing root weight (*x*) significantly lowered percentage (*y*) host mortality (*y* = 81.8 + 7.5(*x*), *r*<sup>2</sup> = 0.57, *P* = 0.0001). Although significant differences between controls and roots >1.5 g were observed for *H. heliothidis*, this nematode species showed greater motility, hence greater host-finding ability, than *S. feltiae* in the presence of roots because host mortality occurred over a shorter period of time with

higher mortality rates and with fewer nematodes. Environmental entomology. Dec 1989. v. 18 (6). p. 1136-1140. Includes references. (NAL Call No.: DNAL QL461.E532).

0564

**Entomotoxic potential of wild and domesticated yellow-green aspergilli: toxicity to corn earworm and fall armyworm larvae.** MYCOAE. Wicklow, D.T., Dowd, P.F. Bronx, N.Y. : The New York Botanical Garden. Mycologia. July/Aug 1989. v. 81 (4). p. 561-566. Includes references. (NAL Call No.: DNAL 450 M99).

0565

**Estragole analogues as attractants for corn rootworms (Coleoptera: Chrysomelidae).**

JEENAI. Metcalf, R.L., Lampman, R.L. Lanham, Md. : Entomological Society of America. Adults of two closely related corn rootworms, *Diabrotica barberi* Smith and Lawrence and *D. virgifera virgifera* LeConte, are strongly attracted to two naturally occurring phenylpropanoids, eugenol and estragole, respectively. The close chemical relationship of these two kairomones suggested that structure-activity studies of estragole analogues as rootworm attractants would be profitable. During the summers of 1986 and 1987, evaluations of 21 chemical compounds related to estragole revealed several exceptional attractants: 4-methoxycinnamaldehyde and 4-methoxycinnamonitrile for *D. v. virgifera*, cinnamyl alcohol for *D. barberi*, and cinnamaldehyde for the southern corn rootworm, *D. undecimpunctata howardi* Barber. Journal of economic entomology. Feb 1989. v. 82 (1). p. 123-129. Includes references. (NAL Call No.: DNAL 421 J822).

0566

**European corn borer (Lepidoptera: Pyralidae) moth captures in aerial water pan traps influenced by replacement of pheromone at different intervals.**

JEENAI. Gray, M.E., Walgenbach, D.D.; Carrick, A.; Troxclair, N.N. Jr.; Hein, G.L. Lanham, Md. : Entomological Society of America. Aerial water pan pheromone traps were used to monitor flights of the European corn borer, *Ostrinia nubilalis* (Hubner), in two locations in South Dakota during 1987 and at three sites in Illinois in 1988. Our objective was to evaluate the effect of different pheromone septa replacement intervals on European corn borer moth captures in aerial water pan pheromone traps. At each location, four treatments were arranged in a randomized complete-block design. The treatments consisted of differing the length of time pheromone septa were allowed to remain in the water pan traps and were as follows: (1) septa replaced weekly, (2) septa replaced biweekly (once every 2 wk), (3) septa replaced every 3 wk or monthly, and (4) traps used without septa. Results indicate that even

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when pheromone septa are changed very infrequently (3 wk to monthly), distinct flights of male European corn borer moths can be detected. Moth captures were generally greater in water pan traps in which septa were changed weekly; however, in many instances, no significant differences in trap catches occurred among the three pheromone replacement treatments. When European corn borer populations are very low, the length of time between pheromone septa replacement may not significantly affect the capture of male moths. Replacement of pheromone septa on a biweekly basis should work satisfactorily for a large-scale monitoring program where expense is a concern. *Journal of economic entomology*. Aug 1991. v. 84 (4). p. 1196-1202. Includes references. (NAL Call No.: ONAL 421 J822).

0567

**European corn borer resistance and cell wall composition of three maize populations.**  
CRPSAY. Buendgen, M.R. Coors, J.G.; Grombacher, A.W.; Russell, W.A. Madison, Wis. : Crop Science Society of America. Feeding activities of herbivorous insects are influenced by host plant nutritional quality. Improved insect resistance resulting from either natural or artificial selection may be due, in part, to changes in nutritive constituents of plants. The first objective of this study was to measure changes in detergent fiber, lignin, ash, and N concentrations in whorls, leaf-sheaths, and stalks of the BS9 maize (*Zea mays L.*) population across five cycles of selection for resistance to the European corn borer (ECB) *Ostrinia nubilalis* (Hubner). The second objective was to evaluate ECB resistance in the WFISIHI and WFISILO maize populations, which were developed for high and low concentrations, respectively, of indigestible plant constituents (acid detergent fiber, lignin, and silica) in the leaf sheath. Leaf-sheath composition for all five cycles of BS9 was measured in three environments in Iowa. Whorl, leaf-sheath and stalk composition, as well as first- and second-generation ECB resistance of populations WFISIHI, WFISILO and Cycles 0, 2, 4, and 5 of BS9 were evaluated in two environments in Wisconsin. Whorl composition was not related to changes in ECB resistance in any population. In BS9, leaf-sheath and stalk concentrations of neutral and acid detergent fiber, cellulose, and lignin increased linearly over selection cycles. In contrast, WFISIHI was as susceptible to second-generation ECB as WFISILO, suggesting that the responses in BS9 may be due to linkage or unintentional selection. Populations BS9, WFISIHI, and WFISILO, however, were derived from diverse sources, and it is likely that mechanisms for resistance differ for the three populations. *Crop science*. May/June 1990. v. 30 (3). p. 505-510. Includes references. (NAL Call No.: ONAL 64.8 C883).

0568

**Evaluation of corn hybrids for resistance to insects.**

GARRA. Widstrom, N.W. McMillian, W.W.; Wiseman, B.R. Athens, Ga. : The Stations. Research report - University of Georgia, College of Agriculture, Agricultural Experiment Stations. Includes statistical data. Dec 1988. (565). p. 28-31. (NAL Call No.: ONAL S51.E22).

0569

**Evaluation of differently colored bucket traps for black cutworm and armyworm (Lepidoptera: Noctuidae).**

JEENAI. Hendrix, W.H. III. Showers, W.B. Lanham, Md. : Entomological Society of America. Differently colored bucket traps were tested to determine if the capture of male moths would be affected. Four colors were tested: yellow top with white bottom (yellow-white), green top with a white bottom (green-white), all white (white), and all green (green). The traps were baited with sex pheromones of black cutworm, *Agrotis ipsilon* (Hufnagel), and armyworm, *Pseudaletia unipuncta* (Haworth). For black cutworms, the yellow/white (mean, 46.1) trap captured significantly more male moths, followed by the white (mean, 23.1) and green-white trap (mean, 21.6). Capture of moths in the green trap was significantly less (mean, 10.9) than for any of the other trap types. For capture of armyworm, the yellow-white and white traps were not significantly different. Similar to capture of *A. ipsilon*, moth capture of *P. unipuncta* (mean, 1.2) in the green trap was significantly less than in the white (mean, 6.5) and yellow-white (mean, 4.8) traps. The yellow-white traps caught significantly more bumblebees than did each of the other traps. Where traps are to be used for both noctuid species and capture of bumblebees is undesirable, the white trap is acceptable. *Journal of economic entomology*. Apr 1990. v. 83 (2). p. 596-598. ill. Includes references. (NAL Call No.: ONAL 421 J822).

0570

**Evaluation of the larval inoculator (Bazooka) for dispensing neonate maize stem borers mixed with maize cob grits.**

JKESA. Barry, D. Chippendale, G.M. Lawrence, Kan. : The Society. *Journal of the Kansas Entomological Society*. July 1988. v. 61 (3). p. 357-359. Includes references. (NAL Call No.: ONAL 420 K13).

0571

**Evaluation of tropical and subtropical corn lines for resistance to second-generation European corn borer (Lepidoptera: Pyralidae).**

JEENAI. Kim, S.K. Guthrie, W.O.; Hallauer, A.R.; Russell, W.A.; Brewbaker, J.L.; Hong, C.S. Lanham, Md. : Entomological Society of America. Open-pedigree corn (*Zea mays L.*)

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inbred lines with tropical (38 lines), subtropical (55 lines), and temperature (27 lines) origins were evaluated for resistance to second-generation European corn borer. *Ostrinia nubilalis* Hubner. Five plants in each plot were infested during anthesis with 10 applications of 50 larvae or 500 per plant. Relative ratings for resistance were taken 50-60 d after anthesis based on a nine-point rating scale (1, no sheath collar feeding damage to 9, severe damage). Differences among mean resistant ratings of the 120 lines were significant; higher resistance was associated with lines having tropical and subtropical germplasm. Twenty-two lines had resistance ratings less than 3.5, and most included either tropical or subtropical germplasm. Resistant ratings were correlated significantly with days to anthesis and silking and plant and ear height. Transfer of the resistant genes from the tropical germplasm to temperate germplasm should be done with caution because of their sensitivity to photoperiodism. *Journal of economic entomology*. Aug 1989. v. 82 (4). p. 1245-1250. Includes references. (NAL Call No.: DNAL 421 J822).

0572

**Evidence for infectivity of maize chlorotic dwarf virus and for a helper component in its leafhopper transmission.**

PHYTAJ. Hunt, R.E. Nault, L.R.; Gingery, R.E. St. Paul, Minn. : American Phytopathological Society. *Phytopathology*. Apr 1988. v. 78 (4). p. 499-504. Includes references. (NAL Call No.: DNAL 464.8 P56).

0573

**Experiments using a simulation model of the Banks grass mite (Acari: Tetranychidae) and the predatory mite *Neoseiulus fallacis* (Acari: Phytoseiidae) in a corn microenvironment.**

EVETEX. Berry, J.S. Holtzer, T.O.; Norman, J.M. Lanham, Md. : Entomological Society of America. The simulation model (MiteSim) of the mite predator-prey system consisting of Banks grass mite, *Oligonychus pratensis* (Banks), and the predatory mite *Neoseiulus fallacis* (Garman) was used to evaluate mite population dynamics in Nebraska corn fields in relation to microenvironmental variables. Simulation results demonstrated the importance of using humidity and temperature conditions at the leaf surface instead of weather station conditions to simulate the mite system on corn in Nebraska. Also, humidity (in addition to temperature) was determined to be critically important in the population dynamics of the two mites. The temperature and humidity at the leaf surface of moderately drought-stressed corn (compared with well-watered corn) resulted in higher simulated populations of Banks grass mite. Simulation studies also showed that colonization of a corn field by less than one adult female Banks grass mite per plant in June can result in mite densities sufficient to cause crop loss by August (Banks grass mite biotic potential without extrinsic mortality). *Environmental entomology*. Aug 1991. v. 20 (4).

p. 1074-1078. Includes references. (NAL Call No.: DNAL QL461.E532).

0574

**Factors affecting bioactivity of soil insecticides: relationships among uptake, desorption, and toxicity of carbofuran and terbufos.**

JEENAI. Felsot, A.S. Lew, A. Lanham, Md. : Entomological Society of America. Toxicities of insecticides applied to soil vary with soil type. The content of organic matter in soil seems to be most strongly associated with differences in toxicity. To test the hypothesis, that partitioning processes in soil influence toxicity by affecting the availability of the insecticides to the insects, we measured the uptake by southern corn rootworm, *Diabrotica undecimpunctata howardii* Barber, larvae of two concentrations of terbufos and carbofuran in four soil types. Desorption of the two insecticides from the soil into a calcium chloride solution also was determined. Concentration-response estimates for each insecticide were correlated with measurements of the uptake of the insecticides by larvae and the potential for desorption of the insecticide. Multiple regression analysis indicated that organic carbon content of the soil accounted for the greatest proportion of variability in LC<sub>50</sub> and LC<sub>95</sub>. Uptake and desorption also were significantly correlated with organic carbon content. The data supported the role of partitioning in explaining toxicity of insecticides applied to soil. *Journal of economic entomology*. Apr 1989. v. 82 (2). p. 389-395. Includes references. (NAL Call No.: DNAL 421 J822).

0575

**Factors affecting capture of corn rootworm beetles (Coleoptera: Chrysomelidae) at traps baited with nonpheromonal attractants.**

EVETEX. Lance, D.R. Lanham, Md. : Entomological Society of America. Adult western corn rootworm, *Diabrotica virgifera virgifera* LeConte, and northern corn rootworm, *D. barberi* Smith and Lawrence, were captured at white and yellow sticky traps and at traps made from plastic vials that contained a mixture of a toxicant and a feeding stimulant. Over 18 d, capture of western corn rootworm was up to 100 times greater at traps baited with estragole or p-methoxycinnamonnitrile (p-MCN) than at unbaited traps; baits of eugenol produced 3- to 50-fold increases in capture of northern corn rootworm. Addition of indole to baits containing estragole or p-MCN had little effect on capture at sticky traps but reduced numbers of both species caught in vials. Daily temperature-activity indices, based on bi-hourly temperatures and on actograph data from a previously published study, explained 26% (female) and 50% (male) of day-to-day variation in capture for western corn rootworm but only about 8% for northern corn rootworm. Lesser proportions of daily variation in capture were explained by raw temperature data

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and by measurements of wind, humidity, and numbers of beetles on plants. When traps were baited with 5, 50, or 500 mg of the attractants, catch of northern corn rootworm on sticky traps increased with the amount of eugenol, but catch of western corn rootworm in vials declined with increases in amount of attractant. Dose of attractant had relatively little effect on capture of western corn rootworm on sticky traps or northern corn rootworm in vials. Both species were captured primarily around midday, except that large numbers of northern corn rootworm (particularly males) were also captured on warm nights. Environmental entomology. Aug 1990. v. 19 (4). p. 882-889. Includes references. (NAL Call No.: DNAL QL461.E532).

0576

**Factors controlling populations and dispersal of the southwestern corn borer, *Diatraea grandiosella* dyar, in the United States.**  
SENTD. Chippendale, G.M. Connor, K.L. College Station, Tex. : Southwestern Entomological Society. The Southwestern entomologist. June 1989. v. 14 (2). p. 182-190. Includes references. (NAL Call No.: DNAL QL461.S65).

0577

**The fall armyworm: a bibliography.**  
FETMA. Ashley, T.R. Wiseman, B.R.; Davis, F.M. Gainesville, Fla. : Florida Entomological Society. Florida entomologist. Bibliography. Mar 1989. v. 72 (1). p. 152-202. (NAL Call No.: DNAL 420 F662).

0578

**Fall armyworm (Lepidoptera: Noctuidae) infestations in no-tillage cropping systems.**  
FETMA. All, J.N. Gainesville, Fla. : Florida Entomological Society. Florida entomologist. Paper presented at the "Fall Armyworm Symposium", 1988. Sept 1988. v. 71 (3). p. 268-272. Includes references. (NAL Call No.: DNAL 420 F662).

0579

**Fecundity of sugarcane borer (Lepidoptera: Pyralidae), as affected by larval development on gramineous host plants.**  
EVETEX. Bessin, R.T. Reagan, T.E. Lanham, Md. : Entomological Society of America. During a 2-yr study investigating the fecundity of the sugarcane borer, *Diatraea saccharalis* (F.), 607 pupae were collected on four gramineous hosts. Weight, length, and diameter of sugarcane borer pupae collected on corn, *Zea mays* L. cv. Merrit, and a sugarcane borer-susceptible sugarcane (a complex hybrid of *Saccharum* spp.) variety, CP 61-37, were greater ( $P$  less than 0.5) than those of pupae collected on johnsongrass, *Sorghum halapense* (L.) Persoon.

Female pupae collected on a moderately resistant sugarcane variety, CP 65-357, weighed significantly less ( $P$  less than 0.05) and were shorter than those collected on CP 61-37 or corn. The sex ratio of sugarcane borer was independent of host plant. The best model for predicting sugarcane borer fecundity was that of a linear regression on pupal weight, with fecundity increasing at 4.3 eggs for each milligram increase in pupal weight, regardless of host or year from which the pupae were collected. Fecundity of moths collected from corn and the susceptible sugarcane variety was greater ( $P$  less than 0.05) than that of moths collected from johnsongrass or the moderately resistant sugarcane variety. The potential finite daily rate of increase of sugarcane borer populations was determined to be 1.132 on corn and CP 61-37, 1.128 on CP 65-357, and 1.119 on johnsongrass. Environmental entomology. June 1990. v. 19 (3). p. 635-639. Includes references. (NAL Call No.: DNAL QL461.E532).

0580

**Feeding activity of *Euschistus servus* and *E. variolarius* (Heteroptera: Pentatomidae) and damage to an early growth stage of corn.**  
JKESA. Apriyanto, D. Sedlacek, J.D.; Townsend, L.H. Lawrence, Kan. : The Society. Journal of the Kansas Entomological Society. July 1989. v. 62 (3). p. 392-399. ill. Includes references. (NAL Call No.: DNAL 420 K13).

0581

**Feeding and pupation sites of *Diatraea lineolata*, *D. saccharalis*, and *Eoreuma loftini* (Lepidoptera: Pyralidae) in relation to corn phenology.**

JEENAI. Rodriguez-del-Bosque, L.A. Smith, J.W. Jr.; Browning, H.W. Lanham, Md. : Entomological Society of America. Location of larvae and pupae of the stalkborers *Diatraea lineolata* (Walker), *D. saccharalis* (F.), and *Eoreuma loftini* (Dyar) at different growth stages of corn was determined for the spring and fall growing seasons in northeastern Mexico. Feeding habits and movements within the plant varied with stalkborer species, larval stages, corn phenology, and growing seasons. However, feeding behavior of all species appeared typical for pyralid corn stalkborers; small larvae fed on tender and succulent tissues (whorls, leaves, leaf sheaths, developing ears), and midsized larvae began tunneling into the stalks. Most large larvae were found in the stalks with few in the ears. Pupation occurred at the sites where the ultimate instars were feeding. *E. loftini* occurred more frequently in leaf sheaths than the other two species. In contrast, *D. lineolata* and *D. saccharalis* were found more frequently in the ears than *E. loftini*. Journal of economic entomology. June 1990. v. 83 (3). p. 850-855. Includes references. (NAL Call No.: DNAL 421 J822).

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0582

Feeding responses of fall armyworm larvae on excised green and yellow whorl tissue of resistant and susceptible corn.  
FETMA. Wiseman, B.R. Isenhour, D.J. Gainesville, Fla. : Florida Entomological Society. Florida entomologist. Paper presented at the "Fall Armyworm Symposium", 1988. Sept 1988. v. 71 (3). p. 243-249. ill. Includes references. (NAL Call No.: DNAL 420 F662).

0583

Field-cage and laboratory evaluations of semiochemical-based baits for managing western corn rootworm (Coleoptera: Chrysomelidae).  
JEENAI. Lance, D.R. Sutter, G.R. Lanham, Md. : Entomological Society of America. Adult western corn rootworms, *Diabrotica virgifera virgifera* LeConte, were offered baits containing toxicant (carbaryl), a feeding stimulant (the curcurbitacins in powdered root of buffalo gourd, *Cucurbita foetidissima* H.B.K. BGRP), and a nonpheromonal attractant (TIC; 1,2,4-trimethoxybenzene, indole, and trans-cinnamaldehyde, 1:1:1). Components were encapsulated into starch granules or were formulated into particles by Control (Warwick, Queensland, Australia). In laboratory assays, baits with approximately 0.5% carbaryl and 3-5% BGRP effectively killed *D. v. virgifera*. Baits with these components plus 0.3-1.5% TIC were broadcast over maize in walk-in field cages; adult *D. v. virgifera* beetles were released, and surviving beetles were counted after 24-72 h. In cages treated at 2-32 kg/ha of starch bait, numbers of beetles were reduced by 69-94%, respectively, relative to untreated cages. Starch granules containing only carbaryl (8 kg/ha) killed few or no beetles, but granules with carbaryl plus BGRP reduced numbers of beetles per cage by approximately 80% in 24 h. Efficacy of baits was not affected by adding 1.5% TIC or by phenology of maize in the cages. Activity of baits declined after 2-3 wks in the field; 3-wk-old baits reduced numbers of beetles per cage by approximately 45%, whereas freshly applied baits produced reductions of approximately 85%. Although not ideal, these formulations appear suitable for testing the concept of semiochemical-based baits on a larger scale. Journal of economic entomology. June 1990. v. 83 (3). p. 1085-1090. Includes references. (NAL Call No.: DNAL 421 J822).

0584

Field corn insect damage potential and risk assessment--New Jersey.  
Race, S.R. New Brunswick, N.J. : The Service. FS - Cooperative Extension Service, Cook College. 1988. (335). 2 p. (NAL Call No.: DNAL S544.3.N5F7).

0585

Field crop insect management guide for Nebraska corn and sorghum.  
NEUAA. Baxendale, F.P. Danielson, S.D.; Witkowski, J.F.; Campbell, J.B.; Peters, L.L.; Hagen, A.F.; Keith, D.L.; Jarvi, K.J.; Seymour, R.C.; Kalisch, J.A. Lincoln, Neb. : The Service. EC - Cooperative Extension Service, University of Nebraska. 1988? . (88-1509). 24 p. (NAL Call No.: DNAL 275.29 N272EX).

0586

Field evaluation of eight substrates for dispensing pheromone of the southwestern corn borer (Lepidoptera: Pyralidae).  
JEENAI. Knutson, A.E. Davis, F.M.; Hedin, P.A.; Phillips, V.A. College Park, Md. : Entomological Society of America. Eight substrates (polyvial, two plastic laminates, two membrane systems, and three rubber septa) were evaluated for dispensing synthetic sex pheromone of the southwestern corn borer (SWCB), *Diatraea grandiosella* Dyar, in field studies during the spring and summer adult flights in Texas. Wire-cone traps baited with an orange plastic laminate substrate captured significantly more SWCB males during the 3-wk spring flight than did traps baited with a blue plastic laminate, rubber septa, or polyvial. All of the release substrates were as attractive as or more attractive than a freshly prepared substrate (changed weekly) after 2 wk of exposure. The third week of exposure, only the Trece red rubber septum (Trece, Salinas, Calif.) and polyvial were significantly less attractive than the freshly prepared septum. During the 3-wk summer evaluation, the membrane-type and plastic laminate substrates captured more SWCB than the other commercially prepared substrates. By the second week of exposure, the attractancy of the polyvial and Trece red rubber septum was significantly less than that of the freshly prepared septum. Pheromone recovery from substrate types ranged from 0 to 82.3% and 2.6 to 75.4% of the initial 1.5 mg concentration following the spring and summer flights. Ratios of the three pheromone components changed during pheromone release, but the changes did not impair attractancy. Attractancy of all substrates was significantly less than that of freshly prepared septa after 3 wk of exposure, indicating that all substrates should be replaced after 2 wk. Journal of economic entomology. Oct 1988. v. 81 (5). p. 1474-1477. ill. Includes references. (NAL Call No.: DNAL 421 J822).

0587

Field evaluation of granular starch formulations of *Bacillus thuringiensis* against *Ostrinia nubilalis* (Lepidoptera: Pyralidae).  
JEENAI. McGuire, M.R. Shasha, B.S.; Lewis, L.C.; Bartelt, R.J.; Kinney, K. Lanham, Md. : Entomological Society of America. *Bacillus thuringiensis* subsp. *kurstaki* Berliner was encapsulated within cornstarch granules with the feeding stimulant Coax or the UV screen

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Congo red and tested at two field sites against European corn borer, *Dstrinia nubilalis* (Hubner), feeding in whorl-stage corn. These tests were done to determine the relative effect of these additives on efficacy of starch-encapsulated *B. thuringiensis*. At both sites, all treatments with *B. thuringiensis* significantly reduced tunneling by *D. nubilalis*. At one site, significant effects of addition of the phagostimulant were observed. When Coax was added at 1 or 10% of starch dry weight with 400 international units (IU) *B. thuringiensis* per mg dry granule weight, response of *D. nubilalis* was equivalent to that obtained with granules containing no feeding stimulant and 1,600 IU/mg. Also, granules with Coax and 400 IU/mg gave a response similar to that obtained from the commercial product Dipel 10G formulated at 1,600 IU/mg. At the other site, the effect of phagostimulant was not significant, primarily because *D. nubilalis* infestation levels were too low for precise discrimination among treatments. Journal of economic entomology. Dec 1990. v. 83 (6). p. 2207-2210. Includes references. (NAL Call No.: DNAL 421 J822).

0588

**Field release and evaluation of *Archytas marmoratus* (Diptera: Tachinidae) against larvae of *Heliothis zea* (Lepidoptera: Noctuidae) in whorl stage corn.**

EVETEX. Gross, H.R. Lanham, Md. : Entomological Society of America. Laboratory-reared adults of the tachinid parasitoid, *Archytas marmoratus* Townsend, were released and evaluated against larvae of *Heliothis zea* (Boddie) in whorl stage corn during 1986-1988. Resulting rates of parasitism by *A. marmoratus* on *H. zea* larvae occurring at 0.3, 0.5, and 1.0 per row-m were 58.3, 44.2, and 52.8%, respectively, when about 340 females/ha were released, and 45.9, 38.2, and 32.1%, respectively, when about 170 females/ha were released. In both studies, no significant differences ( $P > 0.05$ ) in rates of parasitism were found between host densities. The number of *H. zea* larvae parasitized by *A. marmoratus* increased linearly over the range of host densities studied. This suggests that per capita mortality is density-independent and, therefore, should not increase or decrease as host density is varied within the range of early season populations. *A. marmoratus* females appeared to disperse predominately into the prevailing wind. Rates of *A. marmoratus* parasitism were significantly higher ( $P < 0.05$ ) on fourth and fifth instars than on third instars. Approximately 370 and 860 female *A. marmoratus*/ha would be needed to yield 50 and 80% parasitism of fourth and fifth instars of *H. zea*, respectively, in 9-14-leaf stage dent corn. Data suggest that *A. marmoratus* females are highly efficient in finding larvae of *H. zea* in whorl stage corn, and that rates of parasitism observed in the relatively small release areas are likely far lower than could be expected from sustained releases throughout large corn ecosystems wherein the effects of predominately unilateral movement from release areas would be minimized. With the development of economical methods of mass propagation, *A.*

*marmoratus* likely could play a major role in the safe, efficient, and selective management of the early season populations of *H. zea* in whorl stage corn. Environmental entomology. Aug 1990. v. 19 (4). p. 1122-1129. Includes references. (NAL Call No.: DNAL QL461.E532).

0589

**First-generation European corn borer (Lepidoptera: Pyralidae) response to three conservation tillage systems in Minnesota.**

JEENAI. Andow, D.A. Dstlie, K.R. Lanham, Md. : Entomological Society of America. Plant injury and densities of mature larvae by first-generation *Dstrinia nubilalis* (Hubner), European corn borer, were examined in chisel-plow, ridge-tillage, and no-tillage maize, *Zea mays* (L.), in southeastern Minnesota during 1985-1987. Tillage plots were split with and without terbufos application and with and without *Bacillus thuringiensis*-permethrin application in all combinations. Chisel-plow suffered greater plant injury than ridge-tillage or no-tillage, probably because oviposition was greater in chisel-plow. Ovipositing females were not responding primarily to plant height or developmental stage. Soil surface temperatures were higher in chisel-plow during the early evening when oviposition occurred, and we suggest microclimate influenced female oviposition. Larval density was highest in chisel-plow maize that received terbufos. We concluded that the risk of yield loss to first-generation *D. nubilalis* in ridge-tillage and no-tillage maize did not exceed the risk of yield loss in chisel-plow maize. Journal of economic entomology. Dec 1990. v. 83 (6). p. 2455-2461. Includes references. (NAL Call No.: DNAL 421 J822).

0590

**Forecasting *Hydraecia immanis* (Lepidoptera: Noctuidae) moth phenology based on light trap catches and degree-day accumulations.**

JEENAI. Levine, E. Lanham, Md. : Entomological Society of America. The temperature threshold and thermal requirements for total development (egg through 50% moth emergence) of *Hydraecia immanis* Guenee were determined under controlled conditions. Developmental rate was linearly related to temperature (12.8-23.9 degrees C). The threshold temperature, regression equation, coefficient of determination ( $r^2$ ), and degree-days (DD) for total development were 5.3 degrees C,  $y = 0.057X - 0.303$ ,  $r^2 = 0.99$ , and 1,756.8, respectively. Seasonal flight of *H. immanis* was monitored with blacklight traps during 1982-1984 at Lanark, Ill., and cumulative emergence was related to degree-days. Over the 3-yr study, first capture of moths began when an average of 1,324.4 DD had accumulated; 50% moth capture coincided with an average of 1,762.0 DD. A logistic regression model gave projected degree-day requirements of 1,471.2 for 10% and 1,726.9 for 50% catch. Calendar date estimates were considerably less accurate than either

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cumulative degree-days or regression equation methods for predicting published 10 or 50% moth flight at two sites in Wisconsin. The regression model predicted 10% moth flight within 1 to 3 d, depending on site. Only 19 of the 222 moths captured during the 3-yr period were female, whereas 14 of 21 field-collected larvae reared to the adult stage were female. Seventeen of the 19 females captured in the 3-yr study were mated, and the reproductive status of these females was classified as ovipositional. *Journal of economic entomology*. Apr 1989. v. 82 (2). p. 433-438. Includes references. (NAL Call No.: DNAL 421 J822).

EN82).

### 0594

#### The genetic of corn.

AGRYA. Coe, E.H. Jr. Neuffer, M.G.; Hoisington, D.A. Madison, Wis. : American Society of Agronomy. *Agronomy*. In the series *analytic: Corn and Corn Improvement, Third Edition* / edited by G.F. Sprague and J.W. Dudley. 1988. (18). p. 81-258. Includes references. (NAL Call No.: DNAL 4 AM392).

### 0591

#### Fusarium ear rot of corn.

CAGRA. Davis, R.M. Kegele, F.R.; Sills, W.M.; Farrar, J.J. Oakland, Calif. : Division of Agriculture and Natural Resources, University of California. *California agriculture*. Nov/Dec 1989. v. 43 (6). p. 4-5. (NAL Call No.: DNAL 100 C12CAG).

### 0592

#### Generation mean analysis for resistance in maize to the corn leaf aphid (Homoptera: Aphididae).

JEENAI. Bing, J.W. Guthrie, W.D. Lanham, Md. : Entomological Society of America. *Corn leaf aphids Rhopalosiphum maidis* (Fitch) can be a serious pest of maize, *Zea mays* L. Because very little is known about the genetics of corn leaf aphid resistance in maize, a generation mean analysis was conducted on nine generations of maize P<sub>1</sub>, B96 (susceptible); P<sub>2</sub>, Mo17 (resistant); F<sub>1</sub>; F<sub>2</sub>; F<sub>3</sub>; BC<sub>1</sub>; BC<sub>2</sub>; BS<sub>1</sub>; and BS<sub>2</sub> to determine the type of gene action involved. The model that included additive and dominant effects explained 64.8% of the total variation among generations, whereas the model that included additive, dominant, and epistatic effects did not significantly improve the fit. The estimate of the additive genetic effects was most important, indicating that several loci contributed resistance to the corn leaf aphid. Dominant genetic effects were significant, but not as important as additive effects. Residuals remaining after fitting for additive and dominance effects were significant, indicating that more complicated genetic mechanisms may be involved. *Journal of economic entomology*. June 1991. v. 84 (3). p. 1080-1082. Includes references. (NAL Call No.: DNAL 421 J822).

### 0595

#### Genetic resistance of tropical corn inbreds to second-generation European corn borer (Lepidoptera: Pyralidae).

JEENAI. Kim, S.K. Hallauer, A.R.; Guthrie, W.D.; Barry, D.; Lamkey, K.R.; Hong, C.S. Lanham, Md. : Entomological Society of America. Diallel crosses among five resistant (Tz14, Narino330, Hi34, Hi29, Ant.C5) and four susceptible (H132, Tx601, B73, Oh43) maize, *Zea mays* L., inbreds were used to determine the genetic control of resistance to damage by second-generation European corn borer, *Ostrinia nubilalis* Hubner. The nine parents and their 36 crosses each received 10 applications of 50 larvae (500 larvae per plant). Six replications of five plants per plot were infested at anthesis. Visual ratings were taken of sheath and collar tissue 50 to 60 d after infestation based on a nine-point rating scale (1, no damage to 9, severe damage). Significant differences for resistance were observed among the nine parents and the 36 crosses. Ratings of individual crosses varied significantly and averaged 3.7 with range of 1.8 (Tz14 x Narino330) to 5.3 (B73 x Oh43). Heterotic effects for resistance of the 36 crosses averaged -19.5%, which was equivalent to a difference of 1.78 on the rating scale. General (GCA) and specific combining ability (SCA) mean squares were significant with GCA accounting for 82 and SCA for 18% of the total variation among crosses. Among the nine parents, four (Tz14, Narino330, Hi34, Ant.C5) showed greater GCA effects for resistance. *Journal of economic entomology*. Aug 1989. v. 82 (4). p. 1207-1211. Includes references. (NAL Call No.: DNAL 421 J822).

### 0596

#### Genetics of resistance in maize to a complex of three species of thrips (Thysanoptera: Thripidae).

JEENAI. Bing, J.W. Dicke, F.F.; Guthrie, W.D. Lanham, Md. : Entomological Society of America. During summer 1988, a heavy infestation of thrips, *Anaphothrips obscurus* (Mueller), *Frankliniella fusca* (Hinds), and *F. tenuicornis* (Uzel) occurred on maize, *Zea mays* L., allowing for evaluation of resistance in 10 inbred maize lines. Thrips populations peaked at the end of June, and evaluations of the damage were taken at this time. Inbred 41:2504B had the smallest

### 0593

Genetic differentiation of populations of the southwestern corn borer (Lepidoptera: Pyralidae) from the United States and Mexico. AESAAI. McCauley, D.E. Breden, F.J.; Chippendale, G.M.; Mihm, J.A. Lanham, Md. : The Society. *Annals of the Entomological Society of America*. May 1990. v. 83 (3). p. 586-590. Includes references. (NAL Call No.: DNAL 420

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thrips population, B37 had the largest population, and Mo17, C103, and B73 were intermediate. A 10-inbred-line diallel cross, based on damage caused by leaf-feeding, showed that variations due to general combining ability (GCA) and specific combining ability (SCA) were highly significant. Variation due to GCA, however, was 14 times greater than that for SCA, indicating that additive genetic effects were more important than nonadditive effects. The inbred 41:2504B was the most resistant and best general combiner, whereas C103 was the most susceptible to thrips damage. Journal of economic entomology. Apr 1990. v. 83 (2). p. 621-624. Includes references. (NAL Call No.: DNAL 421 J822).

0597

### Growth and survival of southwestern corn borer on whorl and reproductive stage plants of selected corn hybrids.

SENTD. Davis, F.M. Williams, W.P.; Ng, S.S.; Videla, G.W. College Station, Tex. : Southwestern Entomological Society. The Southwestern entomologist. June 1991. v. 16 (2). p. 144-154. Includes references. (NAL Call No.: DNAL QL461.S65).

0598

### Guess who's coming to dinner?

DAGPA. Holland, C. Corvallis, Dr. : The Station. Oregon's agricultural progress - Oregon Agricultural Experiment Station. Winter/Spring 1988. v. 34 (3/4). p. 10-13. ill. (NAL Call No.: DNAL 100 DR3DR).

0599

Habitat-specific parasitism of the stalk borer (Lepidoptera: Noctuidae) in northern Ohio. EVETEX. Felland, C.M. Lanham, Md. : Entomological Society of America. Larvae of the stalk borer, *Papaipema nebris* (Guenee), collected from corn, potatoes, and giant and common ragweed in northern Ohio were reared to pupation to determine parasitism. Parasitoid complexes were dominated by *Lixophaga thoracica* (Curran) (Tachinidae) in corn (78.3% of the total parasitoids); *Sympiesis viridula* (Thompson) (Eulophidae), an introduced parasitoid of European corn borer, *Dstrinia nubilalis* (Hubner), in potatoes and associated common ragweed (62.9%); and *Lissonota brunnea* (Cresson) (Ichneumonidae) and *Gymnochaeta ruficornis* Williston (Tachinidae) in giant ragweed (96.3%). Percentage of parasitism by *G. ruficornis* was positively correlated with stalk borer density; with *L. brunnea* the correlation was negative. This study demonstrates the importance of host habitat for several parasitoids of the stalk borer. Environmental entomology. Feb 1990. v. 19 (1). p. 162-166. Includes references. (NAL Call No.: DNAL QL461.E532).

0600

Hatch of *Diabrotica virgifera* (Coleoptera: Chrysomelidae) eggs exposed to two different overwintering and hatch regimes. JKESA. Fisher, J.R. Lawrence, Kan. : The Society. Journal of the Kansas Entomological Society. Oct 1989. v. 62 (4). p. 607-610. Includes references. (NAL Call No.: DNAL 420 K13).

0601

### Host-seeking behavior of *Eriborus terebrans* (Hymenoptera: Ichneumonidae) toward the European corn borer and the role of chemical stimuli.

AESAAI. Ma, R.Z. Swedenborg, P.D.; Jones, R.L. Lanham, Md. : The Society. Annals of the Entomological Society of America. Jan 1992. v. 85 (1). p. 72-79. ill. Includes references. (NAL Call No.: DNAL 420 EN82).

0602

### *Hymenarcys nervosa* (Say) (Heteroptera: Pentatomidae): another species of stink bug damaging early growth stages of corn in Kentucky.

JESCEP. Sedlacek, J.D. Townsend, L.H. Tifton, Ga. : The Entomological Science Society. Journal of entomological science. Oct 1988. v. 23 (4). p. 402-404. Includes references. (NAL Call No.: DNAL QL461.G4).

0603

Identification of a sex-limited esterase gene from *Diabrotica virgifera virgifera*. PNDAAZ. Rosen, P.P. Gabrielson, D.A.; McDonald, I.C. Grand Forks, N.D. : The Academy. Proceedings of the North Dakota Academy of Science. Apr 1988. v. 42. p. 50. Includes references. (NAL Call No.: DNAL 500 N813).

0604

### Identifying resistance in corn to corn earworm (Lepidoptera: Noctuidae) using a laboratory bioassay.

Buckley, P.M. Davis, F.M.; Williams, W.P. Clemson, S.C. : South Carolina Entomological Society. Journal of agricultural entomology. Jan 1991. v. 8 (1). p. 67-70. Includes references. (NAL Call No.: DNAL SB599.J69).

0605

### Impact of *Euschistus servus* and *Euschistus variolarius* (Heteroptera: Pentatomidae) feeding on early growth stages of corn.

JEENAI. Sedlacek, J.D. Townsend, L.H. College Park, Md. : Entomological Society of America. Abstract: Greenhouse studies were conducted to

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quantify the effects of feeding activity of selected densities of third instars, combined fourth and fifth instars, and adults of *Euschistus servus* (Say) and *E. variolarius* (Palisot de Beauvois) on VE, V2, and V4 corn (*Zea mays* L.). Exposures of VE and V2 corn to all densities of third, fourth and fifth instars, or adults for 96 h resulted in termination of growth, reduced growth, or mortality of plants. There was no mortality of V4 plants. Third instars through adults caused tillering of VE and V2 corn, but only fourth and fifth instars and adults caused tillering of V4. Third instars through adults caused significantly shorter mean extended leaf heights of all growth stages. They also caused significantly lower dry root and aboveground weights of VE and V2 corn. Adults caused significantly lower dry root and aboveground weights of V4 plants. Corn growth stages and adult densities apparently reflect the intensity of damage and may be important factors in assessing damage and determining control strategies. *Journal of economic entomology*. June 1988. v. 81 (3). p. 840-844. Includes references. (NAL Call No.: DNAL 421 J822).

### 0606

**In-canopy chemigation for increased efficiency.**  
Lyle, W.M. Archer, T.L.; Bordovsky, J.P.; Bynum, E.D. St. Joseph, Mich. : The Society. American Society of Agricultural Engineers (Microfiche collection). Paper presented at the 1988 Summer Meeting of the American Society of Agricultural Engineers. Available for purchase from: The American Society of Agricultural Engineers, Order Dept., 2950 Niles Road, St. Joseph, Michigan 49085. Telephone the Order Dept. at (616) 429-0300 for information and prices. 1988. (fiche no. 88-2131). 9 p. Includes references. (NAL Call No.: DNAL FICHE S-72).

### 0607

**Inbreeding depression and gene frequency changes for agronomic traits in corn synthetic selected for resistance to European corn borer.**  
Klenke, J.R. Russell, W.A.; Guthrie, W.D.; Smith, O.S. Clemson, S.C. : South Carolina Entomological Society. *Journal of agricultural entomology*. Oct 1988. v. 5 (4). p. 225-233. Includes references. (NAL Call No.: DNAL SB599.J69).

### 0608

**Incorporation of callus tissue into artificial diet as a means of screening corn genotypes of resistance to the fall armyworm and the corn earworm (Lepidoptera: Noctuidae).**  
JKESA. Isenhour, D.J. Wiseman, B.R. Lawrence, Kan. : The Society. *Journal of the Kansas Entomological Society*. July 1988. v. 61 (3). p. 303-307. Includes references. (NAL Call No.: DNAL 420 K13).

### 0609

**Influence of actual and manual black cutworm (Lepidoptera: Noctuidae) damage on recovery and grain yield of field corn.**  
JEENAI. Whitford, F. Showers, W.B.; Kaster, L.V. Lanham, Md. : Entomological Society of America. The percentage of recovery and yields of corn plants damaged by black cutworm, *Agrotis ipsilon* (Hufnagel), larvae were compared with manual damage. Significant losses in yield generally occurred before the four-leaf stage (84% of all damaged plants). The recovery of corn seedlings from actual damage and manual damage differed; 1982, 50 and 67%; 1983, 34 and 45%; 1984, 54, and 45%. Often seedlings damaged by black cutworm produced greater yields than did manually damaged plants. The degree of yield reduction depended on the position of the growing point within the plant relative to where the plant had been severed (i.e., above, at, or below the soil surface). Corn plants were much less likely to recover if cut by black cutworm below the soil surface. The possible use of manual cutting in screening corn genotypes for their ability to recover from black cutworm damage is discussed. *Journal of economic entomology*. Dec 1989. v. 82 (6). p. 1773-1778. Includes references. (NAL Call No.: DNAL 421 J822).

### 0610

**Influence of alternative host plant feeding on aldrin susceptibility and detoxification enzymes in western and northern corn rootworms.**  
PCBPB. Siegfried, B.D. Mullin, C.A. Duluth, Minn. : Academic Press. *Pesticide biochemistry and physiology*. Oct 1989. v. 35 (2). p. 155-164. Includes references. (NAL Call No.: DNAL SB951.P49).

### 0611

**Influence of corn planting date on the survival and on some reproductive parameters of *Diabrotica virgifera virgifera* (Coleoptera: Chrysomelidae).**  
EVETEX. Fisher, J.R. Sutter, G.R.; Branson, T.F. Lanham, Md. : Entomological Society of America. The effects of three different planting dates of corn and three times of infestation on the survival and subsequent fecundity, egg viability, and longevity of *Diabrotica virgifera virgifera* LeConte were examined under field conditions in eastern South Dakota. Earlier planting and infesting dates resulted in greater survival of adults. Male-female survivorship was affected by the treatments because only the second infestation date, despite planting date, produced a 1:1 male/female sex ratio. When corn was planted and infested at the same time on the first or third date, the sex ratios were 1:1.5 and 2:1, respectively. Female longevity was significantly affected by the latest corn planting and infestation treatment. The various treatments had little effect on fecundity of individual adults derived from the treatment plots or on the viability of their eggs.

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Environmental entomology. Feb 1991. v. 20 (1). p. 185-189. Includes references. (NAL Call No.: DNAL QL461.E532).

0612

**Influence of cover cropping and no-tillage practices on community composition of soil arthropods in a North Carolina agroecosystem.** EVETEX. House, G.J.; Rosario Alzugaray, M. del. Lanham, Md. : Entomological Society of America. Winter legume and grain cover crops preceding corn, *Zea mays* L., grown using conventional and no-tillage methods were investigated for their effect on population dynamics and community structure of soil arthropods. Hairy vetch, *Vicia villosa* Roth, supported higher below-ground arthropod population densities and a more taxonomically diverse fauna than crimson clover, *Trifolium incarnatum* L., or wheat, *Triticum aestivum* L. Pest and beneficial soil arthropods were most abundant in no-tillage corn preceded by hairy vetch. Diversity of soil arthropod species was higher under no-tillage than conventional tillage. Divergences in community structure of soil arthropods among cover crop species, evident early in the season, dissipated by midseason. Arthropod predators were more numerous in no-tillage than conventional tillage systems regardless of previous cover crops. Although no-tillage practices promoted a more trophically balanced soil arthropod community than conventional tillage during early and mid season, in 1987 seedling corn plants in no-tillage vetch treatments sustained significantly higher ( $P$  less than 0.05) damage from the southern corn rootworm, *Diabrotica undecimpunctata howardi* Barber, than in other treatments. Tillage system preference was shown by herbivores: Seedcorn maggot, *Delia platura* (Meigen), occurred in large numbers in conventional tillage, and southern corn rootworm populations were high in no-tillage, especially following legume cover crops. Environmental entomology. Apr 1989. v. 18 (2). p. 302-307. Includes references. (NAL Call No.: DNAL QL461.E532).

0613

**Influence of cropping systems on the number of wireworms (Coleoptera: Elateridae) collected in baits in Missouri cornfields.**

JKESA. Belcher, D.W. Lawrence, Kan. : The Society. Journal of the Kansas Entomological Society. Oct 1989. v. 62 (4). p. 590-592. maps. Includes references. (NAL Call No.: DNAL 420 K13).

0614

**Influence of edaphological factors on residual activity of selected insecticides in laboratory studies with emphasis on soil moisture and temperature.**

JEENAI. Monke, B.J. Mayo, Z.B. Lanham, Md. : Entomological Society of America. A bioassay procedure using southern corn rootworm larvae

(*Diabrotica undecimpunctata howardi* Barber) was used to study the effects of different soils and soil factors on the relative decline in biological activity of six soil insecticides. Larval mortality was used as an index of the effect of various soil factors on the persistence of carbofuran, chlorpyrifos, fonofos, isofenphos, phorate, and terbufos. The range in LC90's across all soils was least for terbufos and greatest for carbofuran. LC90's increased as the percentage of organic matter increased. Temperature had very little effect on the change in mortality. Mortality was least depressed at the high moisture level for chlorpyrifos, isofenphos, and to some extent, carbofuran. Phorate response was variable. Mortality from fonofos and terbufos was appreciably decreased at the high moisture level. Mortality in carbofuran treatments declined as soil pH increased. Chlorpyrifos and terbufos activity decreased in soils with a higher percentage of clay. Carbofuran and isofenphos consistently maintained biological activity the longest. Journal of economic entomology. Feb 1990. v. 83 (1). p. 226-233. Includes references. (NAL Call No.: DNAL 421 J822).

0615

**Influence of European corn borer (Lepidoptera: Pyralidae) feeding on various stages of field corn in Kansas.**

JEENAI. Calvin, D.D. Knapp, M.C.; Xingquan, K.; Poston, F.L.; Welch, S.M. College Park, Md. : Entomological Society of America. Journal of economic entomology. Aug 1988. v. 81 (4). p. 1203-1208. Includes references. (NAL Call No.: DNAL 421 J822).

0616

**Influence of inter-observer variation on insect scouting observations and management decisions.**

JEENAI. Shufran, K.A. Raney, H.G. Lanham, Md. : Entomological Society of America. Accuracy of integrated pest management (IPM) scouting observations was assessed by quantifying inter-observer variation and determining its influence on insect management decisions. During 1984 and 1985, the senior author assumed the role of a scout in the Lincoln Trail area of Kentucky where IPM scouts were employed by a farmer-organized, nonprofit corporation. At the end of the scouting seasons, observations on European corn borer, *Ostrinia nubilalis* (Hubner), on western corn rootworm, *Diabrotica virgifera* LeConte, and on alfalfa weevil, *Hypera postica* (Gyllenhal), made by IPM scouts were compared and contrasted with those recorded by the research scout. A management decision was made for each paired scouting visit using first the research scout's report and then an IPM scout's report. The results suggest that a population estimate based on one person's observations is not adequate to make a correct insect management decisions. Inter-observer variation can affect insect population estimates and management decisions, but it has little effect when populations are

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at subeconomic levels. Economic thresholds should be developed and used with inter-observer variation in mind. Journal of economic entomology. Feb 1989. v. 82 (1). p. 180-185. Includes references. (NAL Call No.: DNAL 421 J822).

0617

**Influence of life history of grasses and maize chlorotic dwarf virus on the biotic potential of the leafhopper *Graminella nigrifrons* (Homoptera: Cicadellidae).**

EVETEX. Hunt, R.E. Nault, L.R. Lanham, Md. : Entomological Society of America. Suitability of annual and perennial species of Sorghum, Lolium, and Panicum and of healthy or maize chlorotic dwarf virus (MCDV)-infected maize (*Zea mays* L.) was determined for oviposition and development of *Graminella nigrifrons* (Forbes). Intra- and intergeneric comparisons show that host life history and genus had a significant effect on the number of adult leafhoppers produced, their weight, and their developmental time from egg to adult, as did the interaction of these effects. More and heavier adults were produced on annual Sorghum and Panicum than on their perennial counterparts. Numbers and weights of leafhoppers produced on annual and perennial Lolium were not significantly different. Developmental time from egg to adult was shorter on annual than on perennial Panicum but was not different within Sorghum and Lolium. Numbers of adults and their weights on Sorghum species were greater than on Lolium species, which was greater than on Panicum species. Evidence that annual grasses may be superior to perennials as hosts within a genus for this generalist leafhopper is consistent with recent studies of natural grasslands that show higher leafhopper densities on annuals during the logarithmic phase of plant growth than at any time on perennials. Although healthy maize was an excellent host for *G. nigrifrons*, MCDV infection improved its suitability. This agrees with previous field (but not laboratory) studies that show young maize to be a suitable host for this leafhopper. Environmental entomology. Feb 1990. v. 19 (1). p. 76-84. Includes references. (NAL Call No.: DNAL QL461.E532).

0618

**Influence of maize pericarp surface relief on resistance to the maize weevil (Coleoptera: Curculionidae).**

JKESA. Tipping, P.W. Legg, D.E.; Rodriguez, J.G.; Poneleit, C.G. Lawrence, Kan. : The Society. Journal of the Kansas Entomological Society. Apr 1988. v. 61 (2). p. 237-241. ill. Includes references. (NAL Call No.: DNAL 420 K13).

0619

**Influence of nozzle type upon the control of the stalkborer using chlorpyrifos and cyfluthrin.**

JPFCD2. Reed, J.P. Hall, F.R.; Willson, H.R. New York, N.Y. : Marcel Dekker. Journal of environmental science and health : Part B : Pesticides, food contaminants, and agricultural wastes. Feb 1990. v. 25 (1). p. 137-150. Includes references. (NAL Call No.: DNAL TD172.J61).

0620

**Influence of plant growth stage on cereal aphid reproduction.**

CRPSAY. Kieckhefer, R.W. Gellner, J.L. Madison, Wis. : Crop Science Society of America. The objective of this research was to determine the influence of the stage of growth of host plants upon the fecundity of cereal aphids. This information is useful in evaluating the potential for cereal aphid movement between, and their colonization of, a sequence of field crops in the Northern Plains and in understanding the epidemiology of plant virus diseases transmitted by cereal aphids. Aphid fecundity was tested in growth chambers on spring wheat (*Triticum aestivum* L.), spring barley (*Hordeum vulgare* L.), sorghum *Sorghum bicolor* (L.) Moench, and maize (*Zea mays* L.) when plants were in the seedling (2-3 leaf), boot, heading, and flowering stages of growth. Aphid fecundity was also compared on vernalized and nonvernalized winter wheat. The aphids tested were the greenbug (GB) *Schizaphis graminum* (Rondani), the English grain aphid (EGA) *Macrosiphum (Sitobion) avenae* (F.), the bird-cherry oat aphid (RP) *Rhopalosiphum padi* (L.), and the corn leaf aphid (CLA) *R. maidis* (Fitch). The results of the tests showed that GB and RP reproduced more on headed wheat than on earlier stages of wheat growth. CLA fecundity was significantly greater on seedling barley than on later stages of growth, but there were no significant differences in GB, RP, and EGA reproduction on barley at the several stages of growth. Seedling maize was virtually immune to RP and CLA colonization; however, GB, RP, and CLA reproduction was greater on seedling sorghum than on older plants. No significant differences were detected in the fecundity of GB, RP, or EGA on vernalized versus nonvernalized winter wheat. The results are interpreted in the context of cereal aphid field biology and state of crop development in the Northern Plains. Crop science. July/Aug 1988. v. 28 (4). p. 688-690. Includes references. (NAL Call No.: DNAL 64.8 C883).

0621

**Influence of plant spacing and nitrogen fertilization in maize on *Dalbulus maidis* (Homoptera: Cicadellidae), vector of corn stunt.**

EVETEX. Power, A.G. Lanham, Md. : Entomological Society of America. The incidence of the corn

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stunt pathogen transmitted to maize by the corn leafhopper, *Dalbulus maidis* (Delong and Wolcott), was reduced in high-density plantings of maize (*Zea mays mays L.*) in Nicaragua. Density was manipulated by modifying the distance between rows or between plants within a row. Although leafhopper populations were not strongly influenced by planting density in this study, the planting arrangement significantly affected leafhopper abundance. At equivalent planting densities, leafhoppers were more abundant in treatments with reduced between-row spacing. This difference was not reflected in the incidence of corn stunt, which tended to be lower in treatments with reduced row spacing. This result can be explained by the effects of planting arrangement on leafhopper movement. In contrast to a previous study, nitrogen fertilization affected maize growth early in the season, but did not significantly influence vector abundance or disease incidence. Environmental entomology. June 1989. v. 18 (3). p. 494-498. Includes references. (NAL Call No.: DNAL QL461.E532).

### 0622

**Influence of soil texture, soil moisture, organic cover, and weeds on oviposition preference of southern corn rootworm (Coleoptera: Chrysomelidae).**  
EVETEX. Brust, G.E. House, G.J. Lanham, Md. : Entomological Society of America. Oviposition preferences of the southern corn rootworm, *Diabrotica undecimpunctata howardi* Barber, were investigated in greenhouse experiments where abiotic and biotic parameters were manipulated. Southern corn rootworm oviposition distance from corn seedlings was quantified. Four soil moistures, four soil textures, and the presence of weeds were examined in caged greenhouse experiments for their effect on southern corn rootworm oviposition preference. Additional experiments were conducted to elucidate southern corn rootworm oviposition preference for corn seedlings in the presence of broadleaf weeds, grass weeds, a wheat straw cover, or bare soil in large-cage experiments in the greenhouse. Southern corn rootworm adults oviposited > 90% of their eggs within 3 cm of a corn stem with <1% oviposited 10-15 cm from the plant. Soil moisture and texture significantly affected oviposition preference. Moist or wet soil and dark soils (moderately high in organic matter and clay) were preferred for oviposition. Significant interactions occurred between these two variables. The presence of weeds significantly increased the number of eggs oviposited and influenced the oviposition preference for particular soil moistures and textures. Southern corn rootworm adults preferred to feed on and oviposit in areas that contained broadleaf weeds compared with grass weeds, wheatstraw, or bare soil. The presence of a wheatstraw cover was significantly ( $P < 0.05$ ) preferred to bare soil. We discuss how this study elucidates a number of seemingly contradictory field observations of southern corn rootworm infestations. Environmental entomology. Aug 1990. v. 19 (4). p. 966-971. illl. Includes references. (NAL Call No.: DNAL QL461.E532).

### 0623

**Influence of susceptible and resistant maize accessions on the development of *Sitophilus zeamais* Motsch. (Coleoptera, Curculionidae) with initial feeding in specific kernel areas.**  
JKESA. Urrelo, R. Wright, V.F. Lawrence, Kan. : The Society. Journal of the Kansas Entomological Society. Jan 1989. v. 62 (1). p. 32-43. illl. Includes references. (NAL Call No.: DNAL 420 K13).

### 0624

**Influence of temperature and humidity on European corn borer (Lepidoptera: Pyralidae) egg hatchability.**  
EVETEX. Godfrey, L.D. Holtzer, T.O. Lanham, Md. : Entomological Society of America. European corn borer, *Ostrinia nubilalis* (Hubner), egg hatch was studied under several temperature and humidity regimes. Percentage of hatch was severely decreased, regardless of the humidity, at 36 and 39 degrees C. Hatch ranged from 74.0 to 0.5% at vapor pressure deficits of 7.5-32.5 mb over the temperature range of 24-33 degrees C in 3 degrees C increments. European corn borer egg batch was affected similarly, from oviposition to larval eclosion, by a 12-h stress period of 14.5, 17.5, and 20.5 mb (at 30 degrees C). Two separate aspects of the egg chorion or two processes in egg hatch are hypothesized to be disrupted by the stressful conditions as evidenced by three plateaus in percentage of eggs hatching as the length of exposure to stress increased. Percentage of hatch remained relatively stable at about 68% with exposure to 33.9-mb stress for less than or equal to 24 h. As the length of stress increased to 36-60 h, the percentage was about 22%. The percentage of hatch fell to only 2.7% at 72 and 84 h of consecutive exposure. Finally, the effect of environmental conditions on egg hatch was additive whether the eggs experienced constant stress or experienced periods of stress alternated with periods of moderate conditions. Results of this study suggest that environmental stresses (i.e., "stress units") may accumulate and affect survival of European corn borer eggs in a manner analogous to temperature units and insect development. Environmental entomology. Feb 1991. v. 20 (1). p. 8-14. Includes references. (NAL Call No.: DNAL QL461.E532).

### 0625

**Influence of temperature on spring emergence of European corn borer moths (Lepidoptera: Pyralidae).**  
DURANT, J.A. Clemson, S.C. : South Carolina Entomological Society. Journal of agricultural entomology. July 1990. v. 7 (3). p. 259-264. Includes references. (NAL Call No.: DNAL SB599.J69).

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0626

Influence of three types of borders on field evaluation of insecticides for fall armyworm (Lepidoptera: Noctuidae) control in seedling corn.

JESCEP. Mullinix, B.G. Jr. Young, J.R.; Ware, G.O. Tifton, Ga. : Georgia Entomological Society. Journal of entomological science. July 1991. v. 26 (3). p. 320-330. Includes references. (NAL Call No.: DNAL QL461.G4).

0627

Influence of tillage systems on egg populations of western and northern corn rootworms (Coleoptera: Chrysomelidae).

JKESA. Gray, M.E. Tollefson, J.J. Lawrence, Kan. : The Society. Journal of the Kansas Entomological Society. Apr 1988. v. 61 (2). p. 186-194. Includes references. (NAL Call No.: DNAL 420 K13).

0628

Influence of weeds in corn plantings on population densities of and damage by second-generation *Ostrinia nubilalis* (Hubner) (Lepidoptera: Pyralidae) larvae.

EVETEX. Pavuk, D.M. Stinner, B.R. Lanham, Md. : Entomological Society of America. In a 2-yr study, population densities of and damage by second-generation European corn borer, *Ostrinia nubilalis* (Hubner), larvae were compared among corn plantings containing or lacking different weed communities. Treatments were corn without weeds, corn principally with broadleaves, corn principally with grasses, and corn with a mixture of broadleaves and grasses. In both years, larval density (number of larvae per corn plant) and damage (number of tunnels per corn plant) were significantly lower in treatments with broadleaves than in treatments without broadleaves. Larval density was significantly lower in treatments with grasses than in treatments without grasses in 1989. The broadleaf X grass interaction was significant for larval density in 1989, and significant for damage in both years. Although natural enemies of *O. nubilalis* may be more abundant and effective in weedy corn, the presence of weeds, particularly grasses, attracts adult moths to cornfields, which may result in larger infestations of corn and greater damage. In addition, weeds may harbor other pests of corn and compete with corn for nutrients and water, leading to reduced yields. Environmental entomology. Feb 1991. v. 20 (1). p. 276-281. Includes references. (NAL Call No.: DNAL QL461.E532).

0629

Influence of winter cover crop suppression practices on seasonal abundance of armyworm (Lepidoptera: Noctuidae), cover crop regrowth, and yield in no-till corn.

EVETEX. Laub, C.A. Luna, J.M. Lanham, Md. : Entomological Society of America. Rye (*Secale cereale* L.), used as a winter cover crop, was killed by paraquat or by mowing with a bushhog. In the early stages of subsequent no-till corn, abundance of armyworm, *Pseudaletia unipuncta* (Haworth), was lower in the mowed treatment compared with the sprayed treatment in three of five fields and did not differ in another field. Over the duration of the first armyworm generation, cumulative armyworm-days in the sprayed treatment were greater than in the mowed treatment in three of five fields and did not differ in another field. Mowing the cover crop was 40% less expensive than spraying. Competition from rye regrowth in the mowed treatment did not diminish yields. Corn silage yields were increased by mowing ( $P = 0.07$ ), and the average increase in net benefit from mowing the cover crop compared with spraying was \$91-113/ba. Cover crop mowing may be an economical and effective means of managing armyworm populations in no-till corn.

Environmental entomology. Apr 1991. v. 20 (2). p. 749-754. Includes references. (NAL Call No.: DNAL QL461.E532).

0630

Insect control for field crops.

Hellman, J.L. Brown, A.; Roberts, J.; Luna, J.M.; Graustein, M. Blacksburg, Va. : Extension Division, Virginia Polytechnic Institute and State University. Publication - Virginia Cooperative Extension Service. In the series analytic: 1988-89 pest management recommendations for field crops. 1989. (456-015). p. 14-34. (NAL Call No.: DNAL S544.3.V8V52).

0631

Insect pests of field crops.

OSSBA. Wilson, H.R. Eisley, B. Columbus, Ohio : The Service. Bulletin - Ohio State University, Cooperative Extension Service. May 1989. (545). 20 p. (NAL Call No.: DNAL 275.29 OH32).

0632

Insect screening results: evaluation of corn hybrids for resistance to insects.

GARRA. Widstrom, N.W. McMillian, W.W.; Wiseman, B.R. Athens, Ga. : The Stations. Research report - University of Georgia, College of Agriculture, Agricultural Experiment Stations. Nov 1989. (585). p. 26-29. (NAL Call No.: DNAL S51.E22).

## (PESTS OF PLANTS - INSECTS)

0633

A kairomone for *Trichogramma nubilale* (Hymenoptera: Trichogrammatidae): isolation, identification, and synthesis. JCECD. Shu, S. Swedenborg, P.D.; Jones, R.L. New York, N.Y. : Plenum Press. A kairomone that effects host-seeking behavior in *Trichogramma nubilale* Ertle and Davis, an egg parasitoid of the European corn borer, *Ostrinia nubilalis* (Hubner), was isolated from moth scales of the European corn borer. The kairomone was identified as a mixture of 11,15-, 13,17-, and 15,19-dimethylnonatriacontanes. The three dimethylnonatriacontanes were synthesized, and bioassays showed that the 13,17 isomer was the most active in terms of klinokinetic and retention effects. The 11,15 isomer and the 15,19 isomer had some effect on klinokinesis, but they failed to effect retention of the wasps. The 13,17-dimethylnonatriacontane is considered to be the most important component of the kairomone. Journal of chemical ecology. Feb 1990. v. 16 (2). p. 521-529. Includes references. (NAL Call No.: DNAL QD415.A1J6).

0634

Kill corn rootworm naturally. Bowman, G. Emmaus, Pa. : Rodale Institute. The New farm. July/Aug 1990. v. 12 (5). p. 31-32, 43. illl. (NAL Call No.: DNAL Si.N32).

0635

Kinetic effects of a kairomone in moth scales of the European corn borer on *Trichogramma nubilale* Ertle & Davis (Hymenoptera: Trichogrammatidae).

JIBEE8. Shu, S. Jones, R.L. New York, N.Y. : Plenum Publishing. Journal of insect behavior. Jan 1989. v. 2 (1). p. 123-131. illl. Includes references. (NAL Call No.: DNAL QL496.J68).

0636

Laboratory and field resistance to the European corn borer in maize germplasm. CRPSAY. Reid, L.M. Arnason, J.T.; Nozzolillo, C.; Hamilton, R.I. Madison, Wis. : Crop Science Society of America. There is a continuing need to screen maize (*Zea mays* L.) germplasm for sources of resistance to the European corn borer, *Ostrinia nubilalis* (Hubner). This study was conducted to determine the resistance characteristics to a univoltine strain of the European corn borer of six groups of maize germplasm and to examine the relationship among resistance characteristics. The groups of germplasm consisted of (i) a latitudinal series of inbred lines; (ii) a set of the indigenous landraces of Mexico; (iii) two Argentine landraces; (iv) three Canadian synthetic populations; (v) three international Maize and Wheat Improvement Center (CIMMYT) maize pools; and (vi) two inbred lines used as controls. In addition, a multiple borer resistance population was studied. All germplasm was

evaluated for seedling DIMBOA 2,4-dihydroxy-7-methoxy(2H)-1,4-benzoxazin-3(-4H)-one content, susceptibility to leaf-feeding (both laboratory and field) and to stalk tunneling by the European corn borer, susceptibility to *Gibberella zeae* (Schwein.) Petch (stalk rot) and *Ustilago zeae* (Beckm.) Unger (corn smut), and their ability to mature in the climatic conditions prevailing at Ottawa, ON. The inbred lines were characterized by high resistance to leaf feeding, but susceptibility to stalk tunneling, whereas the indigenous Mexican landraces were susceptible to leaf feeding. Many significant correlations were found among the various parameters, including validation of the relation of seedling DIMBOA levels and laboratory leaf-feeding tests with the field resistance to European corn borer. This study confirms the importance of examining broad groups of germplasm when searching for sources of resistance to the European corn borer. Crop science. Nov/Dec 1991. v. 31 (6). p. 1496-1502. Includes references. (NAL Call No.: DNAL 64.8 C883).

0637

Laboratory bioassay for resistance in corn to fall armyworm (Lepidoptera: Noctuidae) and southwestern corn borer (Lepidoptera: Pyralidae).

JEENAI. Williams, W.P. Buckley, P.M.; Hedin, P.A.; Davis, F.M. Lanham, Md. : Entomological Society of America. Inbred lines of corn, *Zea mays* L., were evaluated for resistance to leaf feeding by the fall armyworm, *Spodoptera frugiperda* (J. E. Smith), and southwestern corn borer, *Diatraea grandiosella* Dyar, in field and laboratory experiments. For the laboratory bioassays, diets were prepared from lyophilized whorl tissue of field grown plants of resistant and susceptible corn inbred lines. To prepare the diets, 11 g lyophilized tissue was stirred into a mixture of 250 ml distilled water, 2 g agar, 12.5 mg gentamicin sulfate, 132 mg sorbic, and 528 mg ascorbic acid that had been heated to 82 degrees C and poured into 30-ml plastic cups. Cups were infested with two neonate larvae each. Fall armyworm larvae reared for 10 d on diets containing tissue of resistant inbred lines weighed 60% less than those reared on diets containing susceptible inbred tissue. Southwestern corn borer larvae reared for 14 d on whorl tissue from resistant inbred lines weighed 50% less than those reared on susceptible tissue. The laboratory bioassay satisfactorily differentiated among resistant and susceptible corn inbreds. Journal of economic entomology. Aug 1990. v. 83 (4). p. 1578-1581. Includes references. (NAL Call No.: DNAL 421 J822).

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0638

**Late-season parasitoids of the fall armyworm in South Carolina.**

McCutcheon, G.S. Clemson, S.C. : South Carolina Entomological Society. Journal of agricultural entomology. July 1991. v. 8 (3). p. 219-221. Includes references. (NAL Call No.: DNAL SB599.J69).

0639

**Life tables and population dynamics of the southwestern corn borer (Lepidoptera: Pyralidae) in Texas corn.**

EVETEX. Knutson, A.E. Gilstrap, F.E. Lanham, Md. : Entomological Society of America. Life tables are presented from six field populations of first- and second-generation southwestern corn borer, *Diatraea grandiosella* Dyar, infesting corn during a 3-yr study in the Texas High Plains. Survival from egg to adult was greater for first (0.20-0.52) than second (0.007-0.038) generation. Key-factor analysis identified egg mortality during first generation and large larval and diapausing larval mortality during the second generation as largely responsible for observed changes in generation survival. Stage-specific mortality for the first generation was predominately density-independent, and only negligible mortality was caused by natural enemies and intraspecific competition. Density-dependent mortality occurred in large larvae during the second generation. Intraspecific competition (cannibalism) and infection by *Beauveria bassiana* (Balsoma) Vuillemin were major second-generation mortality factors for large larvae and apparently were responsible for the observed density-dependent mortality. Adults developing from first-generation larvae on whorl-stage corn were significantly more fedun than second-generation adults developing as larvae on post-tassel-stage corn. The net reproductive rate was considerably greater during the first ( $R_0 = 95$ ) than second ( $R_0 = 4$ ) generation. Management tactics are proposed for reducing the economic effect of second-generation southwestern corn borer by suppressing the first-generation population increase. Environmental entomology. June 1990. v. 19 (3). p. 684-696. Includes references. (NAL Call No.: DNAL QL461.E532).

0640

**Local and long-range movement of adult western corn rootworm (Coleoptera: Chrysomelidae) as evidenced by washup along southern Lake Michigan shores.**

EVETEX. Grant, R.H. Seevers, K.P. Lanham, Md. : Entomological Society of America. During the months of July through early September from 1984 through 1986, large numbers of live, predominantly female, western corn rootworm (WCR), *Diabrotica virgifera virgifera* LeConte, adults appeared on the southern shoreline of Lake Michigan on 16 occasions. Correlation of the numbers of beetles washed ashore with the passage of synoptic scale weather systems shows

that the beetles accumulate on the shoreline after the passage of cold fronts starting at approximately the date of maximum emergence of WCR and continuing for 24-49 d. The WCR deposited on the shoreline appear to have originated from fields local and distant from the shoreline, with local WCR predominant in deposition events near the time of local maximum emergence and long-distance WCR predominant in deposition events later in the season. Insects appear to be carried along the front. Precipitation does not appear to result in greater deposition of WCR onto the surface, therefore descent of the insect must be by active flight or downdrafts in the front. Environmental entomology. Apr 1989. v. 18 (2) AGL. p. 266-272. Includes references. (NAL Call No.: DNAL QL461.E532).

0641

**Long-term effects of chinch bug (Hemiptera: Heteroptera: Lygaeidae) feeding on corn.**

JEENAI. Negron, J.F. Riley, T.J. Lanham, Md. : Entomological Society of America. Field studies were done during 1986 and 1987 to evaluate effects of *Blissus leucopterus leucopterus* (Say) feeding in field corn, *Zea mays* L. Corn plants were infested with adult chinch bugs at two stages of plant development. Plants damaged by natural infestations of chinch bugs were assigned to one of four damage categories (no damage, slight, moderate, and heavy damage) and allowed to mature. Results from plants artificially infested with chinch bugs at the V2 and V5 stages of development indicated that V2 plants suffered a greater reduction in ear weight and length than did V5 plants. In plants naturally infested with chinch bugs, reductions in ear weight, and length increased in each damage category. Journal of economic entomology. Apr 1990. v. 83 (2). p. 618-620. Includes references. (NAL Call No.: DNAL 421 J822).

0642

**Maize-silk maysin data: comparison of interpretations of quantifications by spectrophotometry and HPLC.**

JAFCAU. Widstrom, N.W. Snook, M.E.; McMillan, W.W.; Waiss, A.C. Jr.; Elliger, C.A. Washington, D.C. : American Chemical Society. Maysin in maize silks is antibiotic to the corn earworm. Our objective was to compare spectrophotometric and reversed-phase HPLC methods of quantifying maysin concentrations. HPLC assay has eliminated abnormally high readings obtained when the spectrophotometric method was used. Maysin of three maize populations, and parents and related generations of two hybrids, was analyzed by both methods and compared. Spectrophotometrically analyzed maysin concentrations of individual silks were similar, but variances differed from those analyzed by HPLC. Spectrophotometric values were scattered for SC235XF44 and its related populations in 1983, but 1988 HPLC determinations produced interpretable data.

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Data from F6XF44 populations in 1983 suggested that F6 has a gene for reducing maysin content, but 1988 HPLC distributions indicated that the gene in F6 is dominant for low maysin content. The changes in interpretation illustrate the importance of using an accurate method for measuring silk maysin concentration. Journal of agricultural and food chemistry. Jan 1991. v. 39 (1). p. 182-184. Includes references. (NAL Call No.: DNAL 381 J8223).

0643

**Management of banks grass mites in field corn: aerial applications of propargite.**  
SENTD. Buschman, L.L. Chowdhury, M.A. College Station, Tex. : Southwestern Entomological Society. The Southwestern entomologist. Sept 1990. v. 15 (3). p. 317-325. Includes references. (NAL Call No.: DNAL QL461.S65).

0644

**Management of diabroticite rootworms in corn.**  
ARENA. Levine, E. Oloumi-Sadeghi, H. Palo Alto, Calif. : Annual Reviews, Inc. Annual review of entomology. Literature review. 1991. v. 36. p. 229-255. Includes references. (NAL Call No.: DNAL 421 AN72).

0645

**Managing corn rootworms--1991.**  
Edwards, C.R. Bledsoe, L.W.; Turpin, F.T. West Lafayette, Ind. : The Service. E - Purdue University, Cooperative Extension Service. In subseries: Field Crops Insects. Dec 1990. (49, rev.). 6 p. (NAL Call No.: DNAL SB844.I6P8).

0646

**Manipulation of larval diapause of the European corn borer (Lepidoptera: Pyralidae) as a potential mechanism of integrated pest management.**

EVETEX. Showers, W.B. Keaster, A.J.; Witkowski, J.F.; Clement, S.L.; Chiang, H.C.; Sparks, A.N. Lanham, Md. : Entomological Society of America. Environmental entomology. Oct 1990. v. 19 (5). p. 1311-1319. Includes references. (NAL Call No.: DNAL QL461.E532).

0647

**Marking western corn rootworm beetles (Coleoptera: Chrysomelidae): effects on survival and a blind evaluation for estimating bias in mark-recapture data.**  
JKESA. Lance, D.R. Elliott, N.C. Lawrence, Kan. : The Society. Journal of the Kansas Entomological Society. Jan 1990. (63). p. 1-8. Includes references. (NAL Call No.: DNAL 420 K13).

0648

**Maysin in corn, teosinte, and centipede grass.**  
ACSMC. Gueldner, R.C. Snook, M.E.; Wiseman, B.R.; Widstrom, N.W.; Himmelsbach, D.S.; Costello, C.E. Washington, D.C. : The Society. ACS Symposium series - American Chemical Society. In the series analytic: Naturally occurring pest bioregulators / edited by P. A. Hedin. 1991. (449). p. 251-263. Includes references. (NAL Call No.: DNAL QD1.A45).

0649

**Mechanisms of resistance in corn to leaf feeding by southwestern corn borer and European corn borer (Lepidoptera: Pyralidae).**  
JEENAI. Davis, F.M. Ng, S.S.; Williams, W.P. Lanham, Md. : Entomological Society of America. No-choice and choice laboratory feeding experiments with excised corn (*Zea mays L.*) leaf tissue were conducted during two summers to determine the resistance mechanisms operating against southwestern corn borer, *Diatraea grandiosella* Dyar, and European corn borer, *Ostrinia nubilalis* (Hubner), larvae in selected hybrids. Two corn hybrids with leaf feeding resistance to the southwestern corn borer and two susceptible corn hybrids were used in the studies. Under no-choice conditions, southwestern corn borer larvae fed for 10 d on leaf tissue from the resistant hybrids weighed significantly less than larvae fed on tissue from one of the susceptible hybrids. In a similar test, European corn borer larvae fed on tissue of the same hybrids for the same time period weighed significantly less on the resistant hybrids than those fed on the susceptible hybrids. Significantly fewer European corn borer larvae survived on tissue from the resistant genotypes. When given a choice, significantly more larvae of both species were observed feeding on tissue from one of the susceptible hybrids than on the other hybrids. We conclude that antibiosis and nonpreference types of resistance mechanisms occur in these hybrids. Journal of economic entomology. June 1989. v. 82 (3). p. 919-922. Includes references. (NAL Call No.: DNAL 421 J822).

0650

**Metabolism, penetration, and partitioning of <sup>14</sup>C aldrin in aldrin-resistant and susceptible corn rootworms.**  
PCBPB. Siegfried, B.D. Mullin, C.A. Duluth, Minn. : Academic Press. Pesticide biochemistry and physiology. Feb 1990. v. 36 (2). p. 135-146. Includes references. (NAL Call No.: DNAL SB951.P49).

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0651

A method for observing below-ground pest-predator interactions in corn agroecosystems.  
JESCEP. Brust, G.E. Tifton, Ga. : Georgia Entomological Society. Journal of entomological science. Jan 1991. v. 26 (1). p. 1-8. ill. Includes references. (NAL Call No.: DNAL QL461.G4).

0652

Methylation of DNA of maize and wheat grains during fumigation with methyl bromide.  
JAFCAU. Starratt, A.N. Bond, E.J. Washington, D.C. : American Chemical Society. Journal of agricultural and food chemistry. Sept/Dct 1988. v. 36 (5). p. 1035-1039. Includes references. (NAL Call No.: DNAL 381 J8223).

0653

Microhabitat and resource selection of the European corn borer (*Lepidoptera: Pyralidae*) and its natural enemies in Maryland field corn. EVETEX. Coll, M. Bottrell, D.G. Lanham, Md. : Entomological Society of America. In western Maryland, the European corn borer, *Ostrinia nubilalis* (Hubner), exhibited three flight periods (from late May to mid-September 1986-1988) but completed only two generations in corn. Oviposition by corn borer moths increased when the tassels emerged and shed pollen. Peak density of the predators *Drius insidiosus* (Say) and *Copromegilla maculata* (Geer) coincided with peak density of the borer's second generation eggs and neonates. Second-generation egg masses were randomly distributed between plants in the field while first instars were aggregated. Corn borer female in the second flight period deposited most eggs (82%) on the ventral surfaces of leaves in the middle sections of plants near silking ears (76.7%). The emerging neonates initially dispersed randomly on the leaves. However, 30 min after emergence, most neonates cued on leaf axils, which served as the most common microhabitat for young larvae. Larval microhabitat differed substantially between the nonoverwintering and overwintering forms and between early and late instars of the nonoverwintering form. Leaf axils were the preferred microhabitat of young larvae, but preference shifted to stalks and ears as larvae matured. Overwintering larvae inhabited almost only stalks. Similarly, *O. insidiosus* adults and nymphs changed their within-plant distribution throughout the season. These changes in the distribution of borer larvae and their predators are discussed in relation to prey and pollen availability in different corn plant microhabitats. Environmental entomology. Apr 1991. v. 20 (2). p. 526-533. Includes references. (NAL Call No.: DNAL QL461.E532).

0654

A microtechnique for antibiosis evaluations against the corn earworm.  
JKESA. Wiseman, B.R. Isenhour, D.J. Lawrence, Kan. : The Society. Journal of the Kansas Entomological Society. Apr 1991. v. 64 (2). p. 146-151. Includes references. (NAL Call No.: DNAL 420 K13).

0655

Modeling the effects of the microsporidium, *Nosema pyrausta*, on the population dynamics of the insect, *Ostrinia nubilalis*. JIVPA. Dnstad, D.W. Maddox, J.V. Duluth, Minn. : Academic Press. Journal of invertebrate pathology. May 1989. v. 53 (3). p. 410-421. Includes references. (NAL Call No.: DNAL 421 J826).

0656

The most important corn insects. AGRYA. Dicke, F.F. Guthrie, W.D. Madison, Wis. : American Society of Agronomy. Agronomy. In the series analytic: Corn and Corn Improvement, Third Edition / edited by G.F. Sprague and J.W. Dudley. 1988. (18). p. 767-867. ill. Includes references. (NAL Call No.: DNAL 4 AM392).

0657

Moth density and oviposition patterns of the European corn borer, *Ostrinia nubilalis* (*Lepidoptera: Pyralidae*), in Alberta. EVETEX. Lee, D.A. College Park, Md. : Entomological Society of America. Density patterns of moths and egg masses of the European corn borer, *Ostrinia nubilalis* (Hubner), in southeastern Alberta were compared to those previously determined for populations in Iowa and New York. In Alberta, significantly more moths were caught in pheromone traps in the center of corn fields than at field borders. More moths were flushed and more egg masses counted in plants in the field center than on those near field edges. Distribution of egg masses was clumped, likely because of differential attractiveness of plants. Numbers of egg masses increased as corn stand density increased. However, in Iowa, moths aggregate in weeds outside the cornfield, and in New York, egg masses are randomly distributed. These differences in moth and egg distribution are related to differences in climate and native vegetation between regions. In arid southeastern Alberta, stands of tall, dense weeds are unavailable outside irrigated cornfields. Environmental entomology. Apr 1988. v. 17 (2). p. 220-224. ill. Includes references. (NAL Call No.: DNAL QL461.E532).

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0658

**Movement of corn rootworm beetles, *Diabrotica* spp. (Coleoptera: Chrysomelidae), at cornfield boundaries in relation to sex, reproductive status, and crop phenology.**

EVETEX. Naranjo, S.E. Lanham, Md. : Entomological Society of America. Canopy and bidirectional Malaise traps were used to estimate the flight activity of northern corn rootworms, *Diabrotica barberi* Smith & Lawrence, and western corn rootworms, *D. virgifera virgifera* LeConte, above the plant canopy and at the lateral boundaries of cornfields. Capture of beetles in both types of traps was greatest during pre- and postflowering intervals, particularly for northern corn rootworms, indicating increased flight activity in response to changes in habitat quality. Based on comparison of ratios of northern/western corn rootworms in the field with those ratios in traps, northern corn rootworm beetles were generally more active at field boundaries than western corn rootworm. There were marked differences in flight activity between males and females and between reproductively immature and mature females of both species. In general, Malaise traps captured a greater number of males and canopy traps a greater number of females in relation to their abundances in source fields. In comparison with source field populations, a greater number of western, but not northern, corn rootworm females captured in canopy traps had immature ovaries, suggesting that vertical movement may represent the initiation of migratory flight. Bidirectional trap results suggest that northern corn rootworm females move from cornfields when silks and pollen become unavailable and later return to fields for oviposition. Comparison of field data with computer simulations for both species suggested that there was substantial emigration from the early-planted field and that most of the beetles in the late-planted field were immigrants. Seasonal trends in flight activity tend to reflect these patterns; however, data from bidirectional Malaise traps failed to provide strong evidence of greater emigration over immigration in the early-planted field or an opposite trend in the late-planted field. Overall, flight activity measured in passive traps at field boundaries may be a poor index. Environmental entomology. Feb 1991. v. 20 (1). p. 230-240. Includes references. (NAL Call No.: DNAL QL461.E532).

0659

**Multiple regression analysis of factors influencing a nuclear polyhedrosis virus in populations of fall armyworm (Lepidoptera: Noctuidae) in corn.**

EVETEX. Mitchell, F.L. Fuxa, J.R. Lanham, Md. : Entomological Society of America. Environmental entomology. Apr 1990. v. 19 (2). p. 260-267. Includes references. (NAL Call No.: DNAL QL461.E532).

0660

**Natural enemies gang up on corn pests.**  
AGREA. Hardin, B. Washington, D.C. : The Service. Agricultural research - U.S. Department of Agriculture, Agricultural Research Service. Aug 1991. v. 39 (8). p. 18-20. (NAL Call No.: DNAL 1.98 AG84).

0661

**Nitidulids as vectors of mycotoxin-producing fungi.**

IWRBB. Dowd, P.F. Ames, Iowa : The Station. Research bulletin - Iowa State University, Agricultural and Home Economics Experiment Station. June 1991. (599). p. 335-342. Includes references. (NAL Call No.: DNAL 100 I09).

0662

**Observations on the emergence of adults from natural populations of corn earworm, *Heliothis zea* (Boddie) (Lepidoptera: Noctuidae).**

EVETEX. Lingren, P.D. Warner, W.B.; Raulston, J.R.; Kehat, M.; Henneberry, T.J.; Pair, S.D.; Zvirgzdins, A.; Gillespie, J.M. College Park, Md. : Entomological Society of America. The emergence of adult corn earworm, *Heliothis zea* (Boddie), was observed throughout the night in corn plots between early and mid-August at Phoenix, Ariz., and early to late June at Brownsville, Tex. Emergence at both locations began between 2000 and 2200 hours, peaked between 2100 and 2300 hours, and ceased between 2400 and 0200 hours. Most emergence of each generation occurred in 10 d or less. Newly emerged adults moved to corn stubble where their wings were expanded and dried. They remained on the stubble for ca. 2.5 h before taking short flights of 30 m or less. Major flight activity was observed between 2400 and 0100 hours and near dawn. Males became sexually mature before females. Sex ratios were variable, with a higher ratio of females to males during the early phases of the emergence cycle. Some moths were observed feeding on exudates from corn stalks before their wings were expanded. Feeding activity intensified during overhead expansion of wings, and newly emerged moths with fully expanded wings fed extensively. Potential applications for this new knowledge are discussed. Environmental entomology. Apr 1988. v. 17 (2). p. 254-258. ill. Includes references. (NAL Call No.: DNAL QL461.E532).

0663

**One-spotted stink bug on corn.**

Edwards, C.R. Turpin, F.T. West Lafayette, Ind. : The Service. E - Purdue University, Cooperative Extension Service. In subseries: Field Crop Insects. Apr 1988. (68). 2 p. ill. (NAL Call No.: DNAL SB844.I6P8).

0664

**Orientation of the European corn borer within the maize plant.**  
JKESA. Barry, D. Mends-Cole, M. Lawrence, Kan. : The Society. Journal of the Kansas Entomological Society. Apr 1991. v. 64 (2). p. 179-184. Includes references. (NAL Call No.: DNAL 420 K13).

0665

**Overwintering of the leafhopper Graminella nigrifrons (Homoptera: Cicadellidae) in northern Ohio.**  
OJSCA. Anderson, R.J. Louie, R.; Knoke, J.K. Columbus, Ohio : Ohio Academy of Science. Ohio journal of science. Sept 1991. v. 91 (4). p. 159-162. Includes references. (NAL Call No.: DNAL 410 OH3).

0666

**Oviposition performance of *Sitophilus zeamais* Motsch. (Coleoptera: Curculionidae) on resistant and susceptible maize accessions.**  
JKESA. Urrelo, R. Wright, V.F. Lawrence, Kan. : The Society. Journal of the Kansas Entomological Society. Jan 1989. v. 62 (1). p. 23-31. 111. Includes references. (NAL Call No.: DNAL 420 K13).

0667

**Oviposition preference by the sugarcane borer (Lepidoptera: Pyralidae).**  
JEENAI. Sosa, O. Jr. Lanham, Md. : Entomological Society of America. Oviposition preference by the sugarcane borer, *Diatraea saccharalis* (F.), on several hosts was compared. The sugarcane borer laid significantly more eggs (78%) on four sugarcane (*Saccharum* spp.) clones than on corn (*Zea mays* L.), sorghum (*Sorghum bicolor* (L.) Moench), rice (*Oryza sativa* L.), or wax paper (22%). More eggs were laid on the leaf surfaces of glabrous sugarcane clones than on a pubescent clone. Although fewer eggs were laid on the leaf surfaces of pubescent clones, oviposition on the midribs (devoid of trichomes) was increased compared with oviposition on the midrib of glabrous clones; this result indicated also that moths avoided pubescent surfaces for oviposition. Overall, the glabrous clones received >2.5 times the number of eggs than the pubescent clone. A commercial sugarcane clone with pubescence might therefore be more resistant to the sugarcane borer than the glabrous clones that are currently grown. Journal of economic entomology. June 1990. v. 83 (3). p. 866-868. Includes references. (NAL Call No.: DNAL 421 J822).

0668

**Ovipositional preferences of the European corn borer (Lepidoptera: Pyralidae) for field corn and cotton under field cage conditions in North Carolina.**

EVETEX. Savinelli, C.E. Bacheler, J.S.; Bradley, J.R. Jr. College Park, Md. : Entomological Society of America. Ovipositional preferences of the European corn borer (ECB), *Ostrinia nubilalis* (Hubner), for several phenological stages of field corn and cotton in field cages were examined in North Carolina from 1981 through 1983. Adults preferred to oviposit on field corn in the silking stage, then shifted to cotton (especially flowering cotton) when the corn silks dried and plants senesced. Environmental entomology. Aug 1988. v. 17 (4). p. 688-690. Includes references. (NAL Call No.: DNAL QL461.E532).

0669

**Ovipositional response of southwestern corn borer (Lepidoptera: Pyralidae) and fall armyworm (Lepidoptera: Noctuidae) to selected maize hybrids.**

JEENAI. Ng, S.S. Davis, F.M.; Williams, W.P. Lanham, Md. : Entomological Society of America. Field cage experiments were done to determine if maize (*Zea mays* L.) hybrids with leaf-feeding resistance to larvae of southwestern corn borer, *Diatraea grandiosella* Dyar, and fall armyworm, *Spodoptera frugiperda* (J. E. Smith), also are less preferred for oviposition under choice conditions. Two resistant maize hybrids (Mp496 X Mp701 and Mp704 X Mp706) and two susceptible hybrids (SC229 X Tx601 and Ab24E X Va35) were tested. Southwestern corn borers laid significantly fewer eggs on the resistant than on the susceptible hybrids. Fall armyworms laid significantly fewer eggs on the resistant hybrids than on SC229 X Tx601 but not on Ab24E X Va35. Thus, females of both species exhibited preference in selection of hosts for oviposition with the resistant hybrids being less preferred. Journal of economic entomology. Aug 1990. v. 83 (4). p. 1575-1577. Includes references. (NAL Call No.: DNAL 421 J822).

0670

**Parasites of the European corn borer (Lepidoptera: Pyralidae) in South Carolina.**  
Wilson, J.A. Jr. DuRant, J.A. Clemson, S.C. : South Carolina Entomological Society. Journal of agricultural entomology. Apr 1991. v. 8 (2). p. 109-116. Includes references. (NAL Call No.: DNAL SB599.J69).

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0671

**Parasitism of Geocoris (Heteroptera: Lygaeidae) eggs by Telenomus reynoldsi (Hymenoptera: Scelionidae) and Trichogramma pretiosum (Hymenoptera: Ichneumonidae) in Alabama.** EVETEX. Cave, R.D. Gaylor, M.J. Lanham, Md. : Entomological Society of America. Eggs of the bigeyed bugs, *Geocoris punctipes* (Say) and *Geocoris uliginosus* (Say), were collected in cotton fields in east-central and northern Alabama from 1983 to 1985 to determine seasonal levels of parasitism by *Telenomus reynoldsi* Gordh and Coker and *Trichogramma pretiosum* Riley. Total host density fluctuated from less than 0.1-3.6 eggs per plant from June to September with maximum densities occurring in late August and early September. The density of eggs parasitized by *T. reynoldsi* was linearly correlated with host density in 1984 and 1985. Parasitism by *T. reynoldsi* varied between 10% and 60%. In 1985, *Geocoris* eggs were deposited about equally on leaves and terminals before mid-June but primarily on leaves thereafter. Rates of parasitism were higher in terminals than on leaves during June. Rates of parasitism up to 58, 77, 27, and 31% were recorded in soybeans, corn, wild mustard, and crimson clover, respectively. *T. pretiosum* parasitized less than 1% of the *Geocoris* eggs in east-central Alabama and 0% in northern Alabama. *Geocoris* is newly recorded as a host for *T. pretiosum*. Environmental entomology. Dec 1988. v. 17 (6). p. 945-951. Includes references. (NAL Call No.: DNAL QL461.E532).

0672

**Parasitism of stem borers (Lepidoptera: Pyralidae) associated with corn and sorghum in the Lower Rio Grande Valley of Texas.** JEENAI. Youm, O. Gilstrap, F.E.; Browning, H.W. Lanham, Md. : Entomological Society of America. Studies were done 1985 to describe the parasitism of stem borers attacking corn (*Zea Mays L.*) and sweet, forage, and grain sorghums (*Sorghum bicolor* (L.) Moench) in the Lower Rio Grande, Texas. Stem borers studied included *Diatraea lineolata* Walker, *Eoreuma* (=*Acigona*) *loftini* (Dyar), *D. saccharalis* F., and *Elasmopalpus lignosellus* (Zeller). Ten species of parasites were reared from one or more of these stem borers including egg parasite *Trichogramma* sp. (Hymenoptera: Ichneumonidae); larval parasites *Bracon* sp., *Orgilus* sp., *Orgilus gelechiaevorus* (Cushman), *Cotesia* (=*Apanteles*) *flavipes* (Cameron), *Iphiaulax* sp., *Allorhogas pyralophagus* Marsh, *Chelonus sonorensis* (Cameron), and *Rhygoplitis aciculatus* (Ashmead); and larval-pupal parasite *Archytas marmoratus* (Townsend). The gregarious larval parasite *C. flavipes* attacked *D. saccharalis* more frequently than other borers on corn and sorghum, and parasitism of all stem borers was generally very low and ineffective for control. Journal of economic entomology. Feb 1990. v. 83 (1). p. 84-88. Includes references. (NAL Call No.: DNAL 421 J822).

0673

**Parasitism of the fall armyworm (Lepidoptera: Noctuidae) by *Campoletis sonorensis* (Hymenoptera: Ichneumonidae) as affected by host feeding on silks of *Zea mays* L. cv. Zapalote Chico.** EVETEX. Isenhour, D.J. Wiseman, B.R. Lanham, Md. : Entomological Society of America. The effects of parasitism by *Campoletis sonorensis* (Cameron) and silk-feeding resistance of *Zea mays* L. cv. Zapalote Chico were evaluated for their effect on growth and development of the fall armyworm, *Spodoptera frugiperda* (J. E. Smith). Individually, parasitism or a meridic diet containing silks from 'Zapalote Chico' resulted in a significant reduction in larval growth of fall armyworm. The combining of these two factors was found to be additive in their ability to reduce larval growth. Progeny of *C. sonorensis* from fall armyworm fed a meridic diet containing silks of 'Zapalote Chico' had prolonged times to pupation and adult eclosion compared with parasitoids from fall armyworm fed a diet without resistant silks. Environmental entomology. June 1989. v. 18 (3). p. 394-397. Includes references. (NAL Call No.: DNAL QL461.E532).

0674

**Pediobius furvus parasitization of overwintering generation southwestern corn borer pupae.**

SENTD. Overholt, W.A. Smith, J.W. Jr. College Station, Tex. : Southwestern Entomological Society. The Southwestern entomologist. Mar 1989. v. 14 (1). p. 35-40. Includes references. (NAL Call No.: DNAL QL461.S65).

0675

**Performance of maize inbred line DE811 in hybrid combinations: resistance to first- and second-generation European corn borers (Lepidoptera: Pyralidae).**

JEENAI. Guthrie, W.D. Hawk, J.A.; Jarvis, J.L. Lanham, Md. : Entomological Society of America. Inbred line DE811 was crossed with 12 dent maize, *Zea mays* L., inbred lines. The 12 inbred lines, plus DE811 and a check inbred line, and 12 single crosses, plus two single-cross checks, were planted in a modified randomized block design for 3 yr, with five replications each year. First-generation European corn borer, *Ostrinia nubilalis* Hubner, plots were separate from the second-generation European corn borer plots (two hills of three plants for each plot in each experiment). Plants in the first-generation tests were infested during the midwhorl stage of plant development, whereas plants in the second-generation tests were infested during anthesis. Plants in each test were infested with 12 egg masses (300 eggs) per plant in six applications of two masses, spaced 1 d apart. Leaf-feeding ratings in the first-generation tests were made 3 wk after egg hatch. Sheath-collar feeding ratings and stalk damage were made 60 d after egg hatch in the second-generation tests. In combination with

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several susceptible inbred lines, DE811 resistance showed partial dominance for resistance to leaf feeding by first-generation European corn borers and for resistance to sheath-collar feeding and stalk damage by second-generation European corn borers. Single crosses of DE811 X resistant inbred lines had high resistance to both European corn borer generations. Journal of economic entomology. Dec 1989. v. 82 (6). p. 1804-1806. Includes references. (NAL Call No.: DNAL 421 J822).

0676

Persistence and degradation of PP993 pyrethroid, fonofos, and chlorpyrifos in a Quebec cornfield's soil. BECTA6. Elhag, F.A. Yule, W.N.; Marshall, W.D. New York, N.Y. : Springer-Verlag. Bulletin of environmental contamination and toxicology. Feb 1989. v. 42 (2). p. 172-176. Includes references. (NAL Call No.: DNAL RA1270.P35A1).

0677

Pest Control in Arkansas cereal crops through genetic resistance. AKFRAC. Bacon, R.K. Moldenhauer, K.A.K.; York, J.O. Fayetteville, Ark. : The Station. Arkansas farm research - Arkansas Agricultural Experiment Station. May/June 1990. v. 39 (3). p. 8. ill. (NAL Call No.: DNAL 100 AR42F).

0678

Pheromone delivery system: western corn rootworm (Coleoptera: Chrysomelidae) pheromone encapsulation in a starch borate matrix. JEENAI. Meinke, L.J. Mayo, Z.B.; Weissling, T.J. Lanham, Md. : Entomological Society of America. Western corn rootworm, *Diabrotica virgifera virgifera* LeConte, sex pheromone, racemic 8-methyl-2-decyl-propanoate (MDP) was successfully encapsulated in a starch borate (SB) matrix creating a controlled release granular formulation. The release rate of MDP from starch borate granules was attractive to male *D. virgifera* at high and low *D. virgifera* population levels in field corn. Male *D. virgifera* were attracted to the SB-MDP granules throughout the growing season, but efficacy declined during the period of peak female *D. virgifera* emergence and corn pollination. The SB-MDP delivery system was as effective as a septa-MDP delivery system, and SB-MDP formulations had a shelf life of at least 2 yr. Data suggest that the starch matrix concept may be useful as a delivery system for semiochemicals and may have potential as a tool that can be used in the development of new, more environmentally sound insect management systems. Journal of economic entomology. Dec 1989. v. 82 (6). p. 1830-1831. Includes references. (NAL Call No.: DNAL 421 J822).

0679

Phylogenetic relatedness of maize chlorotic dwarf virus leafhopper vectors. PHYTAJ. Nault, L.R. Madden, L.V. St. Paul, Minn. : American Phytopathological Society. Twenty-five leafhopper (Cicadellidae) species from 13 genera representing three tribes (Deltcephalini, Euscelini, and Macrosteolini) in the subfamily Deltcephalinae were tested as vectors of the semipersistently transmitted maize chlorotic dwarf virus (MCDV). Vectors and their estimated percent transmission by single insects when maize served as the virus source and inoculation test plant were: *Graminella nigrifrons*, 35.9%; *Amblysellus grex*, 24.8%; *Stirellus bicolor*, 13.7%; *Planicephalus flavocostatus*, 12.9%; *Exitianus exitiosus*, 12.6%; *G. sonora*, 10.5%; *Macrosteles severini*, 1.9%; and *Endria inimica*, 1.5%. Leafhopper species that did not transmit MCDV from maize to maize were *Baldulus tripsaci*, *Cicadulina mbila*, nine *Dalbulus* species, *Euscelidius variegatus*, *G. fitchii*, *G. oquaka*, *M. fascifrons*, *Ollarianus strictus*, and *Psammotettix lividellus*. When johnsongrass rather than maize was used as a virus source and test plant, *G. oquaka* transmitted MCDV. When the relationship between transmission rate of MCDV by a leafhopper species and its phylogenetic (evolutionary) relatedness to *G. nigrifrons* (the principal field vector) was evaluated by Kendall's tau correlation analysis, there was a significant positive relationship for phylogeny with one (*P* less than 0.05), but not a second (*P* greater than 0.10) proposed phylogeny, when all leafhopper species used in this study were considered. When grass-specializing leafhoppers whose developmental hosts that do not include maize were excluded from the analysis, both phylogenies were significantly correlated (*P* less than 0.01) with MCDV transmission. From this study, it can be predicted that leafhopper species from the tribes Deltcephalini or recent (advanced) Euscelini that use maize as a feeding and breeding host have a high probability of being MCDV vectors, whereas leafhoppers from those taxa that do not feed well on maize or those from the primitive Euscelini or Macrosteolini, even if maize is a preferred host, have a low *p*. Phytopathology. Dec 1988. v. 78 (12.pt.2). p. 1683-1687. Includes references. (NAL Call No.: DNAL 464.8 P56).

0680

Plant damage and survival of European corn borer (Lepidoptera: Pyralidae) larvae reared for 22 years on resistant and susceptible inbred lines of maize. JKESA. Guthrie, W.D. Jarvis, J.L. Lawrence, Kan. : The Society. Journal of the Kansas Entomological Society. Jan 1990. (63). p. 193-195. Includes references. (NAL Call No.: DNAL 420 K13).

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0681

**Plant odor preferences and learning in Macrocentrus grandii (Hymenoptera: Braconidae), a larval parasitoid of the European corn borer, Ostrinia nubilalis (Lepidoptera: Pyralidae).**  
JKESA. Ding, D. Swedenborg, P.D.; Jones, R.L. Lawrence, Kan. : The Society. Journal of the Kansas Entomological Society. Apr 1989. v. 62 (2). p. 164-176. Includes references. (NAL Call No.: DNAL 420 K13).

R. padi in corn had a mean life span of approximately 14 d and a maximum life span of 41 d, which is sufficient time for fall-planted cereals to become infested with these migrants. Monthly maximum and minimum temperatures for epidemic and nonepidemic years differed most in December, January, and February, suggesting a possible temperature-disease relationship. Environmental entomology. Feb 1991. v. 20 (1). p. 166-173. Includes references. (NAL Call No.: DNAL QL461.E532).

0682

**Plant resistance to insects attacking corn and grain sorghum.**  
FETMA. Wiseman, B.R. Davis, F.M. Gainesville, Fla. : Florida Entomological Society. Florida entomologist. Sept 1990. v. 73 (3). p. 446-458. Includes references. (NAL Call No.: DNAL 420 F662).

0685

**Population dynamics of stalk borers attacking corn and sorghum in the Texas Rio Grande Valley.**  
SENTO. Youm, O. Browning, H.W.; Gilstrap, F.E. College Station, Tex. : Southwestern Entomological Society. The Southwestern entomologist. Sept 1988. v. 13 (3). p. 199-204. Includes references. (NAL Call No.: DNAL QL461.S65).

0683

**Population dynamics of corn earworm larvae (Lepidoptera: Noctuidae) on corn in the Lower Rio Grande Valley.**  
EVETEX. Raulston, J.R. Summy, K.R.; Loera, J.; Pair, S.D.; Sparks, A.N. Lanham, Md. : Entomological Society of America. Environmental entomology. Apr 1990. v. 19 (2). p. 274-275. Includes references. (NAL Call No.: DNAL QL461.E532).

0686

**Potential for using maize as a trap crop for the fall armyworm, Spodoptera frugiperda (Lepidoptera: Noctuidae), where sorghum and maize are intercropped on subsistence farms.**  
FETMA. Castro, M. Pitre, H.; Meckenstock, D. Gainesville, Fla. : Florida Entomological Society. Florida entomologist. Paper presented at the "Fall Armyworm Symposium", 1988. Sept 1988. v. 71 (3). p. 273-278. Includes references. (NAL Call No.: DNAL 420 F662).

0684

**Population dynamics of Rhopalosiphum padi (Homoptera: Aphididae) in corn in relation to barley yellow dwarf epidemiology in southwestern Idaho.**  
EVETEX. Blackmer, J.L. Bishop, G.W. Lanham, Md. : Entomological Society of America. Population dynamics of Rhopalosiphum padi (L.) in seed and silage corn were investigated from 1981 through 1985 in southwestern Idaho. Aphid population development was divided into four phases: an immigration period, a lag period, a period of rapid increase where aphid numbers reached several million per hectare, and an emigration period characterized by an increase in alatoid nymphs and alatae. Just before peak aphid densities occurred, prereproductive development time for apterous R. padi was 9.9 +/- 0.9 d (average +/- SEM) in seed corn and 9.6 +/- 0.5 d in silage corn. The reproductive rate of apterae during this same period was 36.6 +/- 11.0 nymphs in seed corn and 9.8 +/- 2.9 nymphs in silage corn. Flight activity, as indicated by suction trap data, peaked in July and again from September through October or November. These two peaks corresponded with the immigration and emigration of R. padi detected in corn. Residents on corn were assayed for transmission of barley yellow dwarf virus, and the mean frequencies were 36% in 1983, 4% in 1984, and 2% in 1985. Migrant R. padi collected in a modified suction trap in 1985 showed a mean transmission frequency of 6%. Fall migrant

0687

**Potential of starch encapsulated semiochemical-insecticide formulations for adult corn rootworm (Coleoptera: Chrysomelidae) control.**  
JEENAI. Weissling, T.J. Meinke, L.J. Lanham, Md. : Entomological Society of America. Field and laboratory experiments were conducted from 1987 through 1989 to determine if plant-derived semiochemicals and carbamate insecticides, encapsulated in starch-borate (SBM) and pregelatinized-starch (PGM) matrices, could be used to attract and kill corn rootworm (*Diabrotica* spp.) beetles. *D. virgifera virgifera* LeConte adults were concentrated in plots within a corn (*Zea mays* L.) field, following application of SBM granules formulated with semiochemicals and carbaryl. However, resulting mortality was low even though beetles were observed feeding on the granules. Low mortality levels appear to have been caused by a loss of carbaryl during the formulation process. Laboratory assay results indicated that carbaryl, methomyl or carbofuran formulated in the PGM effectively killed *D. virgifera* adults but only SBM granules formulated with carbofuran provided acceptable mortality. PGM semiochemical-insecticide granules placed in traps killed *Diabrotica* spp. over time in field corn. *D. v. virgifera* and *D.*

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*undecimpunctata howardi* Barber mortality in plots treated with starch-encapsulated semiochemical-insecticide granules were comparable to mortality observed in plots treated with a broadcast application of carbaryl (Sevin XLR Plus) while using 90% less insecticide. Mortality of *D. barberi* Smith & Lawrence was significantly greater in Sevin XLR Plus-treated plots than in plots treated with starch granules. Mortality of the coccinellid *Coleomegilla maculata lengi* Timberlake was significantly greater in plots treated with Sevin XLR Plus than in plots treated with starch granules, whereas a reverse trend was observed for the carabid *Harpalus pennsylvanicus* De Geer. Data suggest that efficacy of starch matrix delivery systems may be affected by the interaction of various biotic and abiotic factors but starch matrices appear to have potential as tools that could be used in the development of new, more environmentally sound, corn rootworm management programs. *Journal of economic entomology*. Apr 1991. v. 84 (2). p. 601-609. Includes references. (NAL Call No.: DNAL 421 J822).

0688

Potential of 8-methyl-2-decyl propanoate and plant-derived volatiles for attracting corn rootworm beetles (Coleoptera: Chrysomelidae) to toxic bait.

JEENAI. Lance, D.R. College Park, Md. : Entomological Society of America. Populations of *Diabrotica virgifera virgifera* LeConte (WCR) and *D. barberi* Smith and Lawrence (NCR) were monitored in plots (15 by 15 m) that contained 5 x 5 grids of toxic baits in vial traps. For plots in which baits consisted of only olive oil plus carbaryl, 0.4 wCR and 3.6 NCR per bait were captured. In plots in which a feeding stimulant (cucurbitacin) was added, capture per bait was 12.4 WCR and 22.3 NCR. Addition of plant-derived volatile attractants (estrugole for WCR and eugenol for NCR) increased capture of the respective species another four times. The racemate o, -R-methyl-2R-decyl propanoate (the apparent sex pheromone of both species) caused an increase in numbers of male WCR captured on unbaited sticky traps within plots, but the amount used (900 microgram per bait) was apparently too great for optimal attraction of males to point sources. The racemate also repelled NCR of both sexes. Over 6 d, traps that were baited with estrugole and eugenol removed more WCR and NCR than were estimated to have been in the plots at the start of the test; because of immigration, however, there were no detectable reductions in numbers of beetles on plants within those plots. Feeding stimulants and plant volatiles show great promise for enhancing the effectiveness of adulticides, but, because of the beetles' vagility, the concept must be tested over much broader acreages. *Journal of economic entomology*. Oct 1988. v. 81 (5). p. 1359-1362. Includes references. (NAL Call No.: DNAL 421 J822).

0689

Predators and parasites of the southwestern corn borer (Lepidoptera: Pyralidae) in Texas corn.

JKESA. Knutson, A.E. Gilstrap, F.E. Lawrence, Kan. : The Society. *Journal of the Kansas Entomological Society*. Oct 1989. v. 62 (4). p. 511-520. Includes references. (NAL Call No.: DNAL 420 K13).

0690

Properties of a cytochrome P-450-dependent epoxidase in aldrin-resistant western corn rootworms, *Diabrotica virgifera virgifera* LeConte.

PCBPB. Siegfried, B.D. Mullin, C.A. Duluth, Minn. : Academic Press. *Pesticide biochemistry and physiology*. July 1988. v. 31 (3). p. 261-268. Includes references. (NAL Call No.: DNAL SB951.P49).

0691

Purification of esterase-m from *Diabrotica virgifera virgifera*.

PNDAAZ. Rosen, P.P. Altenhofen, D.G.; Gabrielson, D.A.; McDonald, I.C. Grand Forks, N.D. : The Academy. *Proceedings of the North Dakota Academy of Science*. Apr 1989. v. 43. p. 79. Includes references. (NAL Call No.: DNAL 500 N813).

0692

Reaction of two maize synthetics to anthracnose stalk rot and northern corn leaf blight following recurrent selection for resistance to *Diplodia* stalk rot and European corn borer.

PHYTAU. Nyhus, K.A. Russell, W.A.; Guthrie, W.D.; Martinson, C.A. St. Paul, Minn. : American Phytopathological Society. Two maize (*Zea mays*) synthetics, BSAA and BSBB, were recurrently selected for resistance to *Diplodia* (*Diplodia maydis*) stalk rot (DSR) and leaf feeding caused by the first-generation European corn borer (*Ostrinia nubilalis*) (ECB), based on the reaction of S1 lines to artificial inoculations of *D. maydis* and artificial infestations of the ECB. This study was conducted to determine if plant factors contributing to DSR and ECB resistance also conferred resistance to anthracnose stalk rot (ASR) caused by *Colletotrichum graminicola* and northern corn leaf blight (NLB) caused by *Exserohilum turcicum*. Highly significant linear improvements in ASR resistance were observed over cycles (C0 to C4) of selection in both synthetics. These improvements mirrored the gains reported previously for DSR resistance in BSAA and BSBB and suggested that a genetic correlation exists between DSR resistance and ASR resistance in these populations. NLB severity ratings were recorded on six dates throughout the growing season. A natural logarithm transformation was used to describe the disease progress curve for each of the C0

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to C4 populations of each synthetic. Linear regression of lnNLB ratings on lnDATE (days after inoculation) accounted for more than 97% of the variation among entries when averaged over replications. Our results showed no concomitant improvement in NLB resistance over cycles of selection for ECB resistance, contradicting previous reports that 2,4-dihydroxy-7-methoxy-2H-1,4-benzoxazin-3-one (DIMBOA), a known biochemical factor in leaf-feeding resistance, confers resistance to NLB. *Phytopathology*. Feb 1989. v. 79 (2). p. 166-169. Includes references. (NAL Call No.: DNAL 464.8 P56).

0693

**Recovery of virulence of European corn borer larvae (Lepidoptera: Pyralidae) to damage maize plants after being reared on a meridic diet.**  
JKESA. Guthrie, W.D. Jarvis, J.L. Lawrence, Kan. : The Society. *Journal of the Kansas Entomological Society*. Jan 1989. v. 62 (1). p. 135-137. Includes references. (NAL Call No.: DNAL 420 K13).

0694

**Red-winged blackbird and starling feeding responses on corn earworm-infested corn.**  
PVPCB. Okurut-Akol, F.H. Woronecki, P.P. Davis, Calif. : University of California. *Proceedings ... Vertebrate Pest Conference*. Meeting held March 6-8, 1990, Sacramento, California. July 1990. (14th). p. 296-301. Includes references. (NAL Call No.: DNAL SB950.A1V4).

0695

**Reduced rates of chemigated chlorpyrifos for control of European corn borer (Lepidoptera: Pyralidae) in whorl stage corn.**  
JKESA. Currier, D. Witkowski, J.F. Lawrence, Kan. : The Society. *Journal of the Kansas Entomological Society*. Oct 1988. v. 61 (4). p. 401-405. Includes references. (NAL Call No.: DNAL 420 K13).

0696

**Reduction of European corn borer (Lepidoptera: Pyralidae) damage by intercropping corn with soybean.**  
JEENAI. Martin, R.C. Arnason, J.T.; Lambert, J.D.H.; Isabelle, P.; Voldeng, H.D.; Smith, D.L. Lanham, Md. : Entomological Society of America. Corn, *Zea mays* L., and soybean, *Glycine max* (L.) Merrill, were intercropped for silage in 1985 and 1986 at the Central Experimental Farm, Ottawa, to determine effects on yields and the percentage of European corn borer, *Ostrinia nubitalis* Hubner, infestation. A 2 x 2 x 3 factorial was analyzed with two corn hybrids (dwarf PAG 391134 and tall Coop S259), two corn cropping systems (monocropped and intercropped), and three nitrogen

fertilizer levels (0, 60, and 120 kg N/ha). Intercropping significantly reduced European corn borer infestation in tall corn in 1985 and in both corn hybrids in 1986. Dwarf corn was infested significantly less than tall corn in both years and in both cropping systems. The commonly applied rate of 120 kg N/ha resulted in the highest European corn borer infestation. Yields and land equivalent ratios at 60 kg N/ha were as high as those at 120 kg N/ha, but European corn borer infestation was significantly less at 60 kg N/ha. Application of 0 kg N/ha resulted in the lowest yields and land equivalent ratios, but European corn borer infestation was not different from levels at 60 kg N/ha. *Journal of economic entomology*. Oct 1989. v. 82 (5). p. 1455-1459. Includes references. (NAL Call No.: DNAL 421 J822).

0697

**Registration of BS17(CB)C4 and BS16(CB)C4 maize germplasm.**  
CRPSAY. Russell, W.A. Guthrie, W.D. Madison, Wis. : Crop Science Society of America. *Crop science*. Jan/Feb 1991. v. 31 (1). p. 238-239. Includes references. (NAL Call No.: DNAL 64.8 C883).

0698

**Registration of B96 germplasm line of maize.**  
CRPSAY. Guthrie, W.D. Russell, W.A.; Bing, J.W.; Dicke, F.F. Madison, Wis. : Crop Science Society of America. *Crop science*. Jan/Feb 1991. v. 31 (1). p. 239-240. Includes references. (NAL Call No.: DNAL 64.8 C883).

0699

**Registration of GT-DDSA (C5) and GT-DDSB (C5) maize germplasms.**  
CRPSAY. Widstrom, N.W. Wiseman, B.R.; McMillian, W.W. Madison, Wis. : Crop Science Society of America. *Crop science*. Nov/Dec 1988. v. 28 (6). p. 1036-1037. Includes references. (NAL Call No.: DNAL 64.8 C883).

0700

**Registration of Mp708 germplasm line of maize.**  
CRPSAY. Williams, W.P. Davis, F.M.; Windham, G.L. Madison, Wis. : Crop Science Society of America. *Crop science*. May/June 1990. v. 30 (3). p. 757. Includes references. (NAL Call No.: DNAL 64.8 C883).

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0701

### Relation of corn leaf aphid (Homoptera: Aphididae) colonization to DIMBOA content in maize inbred lines.

JEENAI. Bing, J.W. Guthrie, W.D.; Dicke, F.F.; Obrychi, J.J. Lanham, Md. : Entomological Society of America. Five inbred maize (*Zea mays L.*) lines (B37, B73, Ci03, Mo17, and 41:2504B) were evaluated from emergence to the eight-leaf stage for corn leaf aphid (*Rhopalosiphum maidis* (Fitch)) colonization. Concentration of 2,4-dihydroxy-7-methoxy-1,4-benzoxazin-3-one (DIMBOA) in these inbred lines was analyzed from emergence to anthesis to determine its effect on corn leaf aphid colony development. Inbred line 41:2504B, which was colonized by corn leaf aphids as it emerged from the soil, had the highest DIMBOA concentration. Inbred lines B73 and B37 were low in DIMBOA and were colonized in the three- and six-leaf stages, respectively. Inbred lines Ci03 and Mo17 also were low in DIMBOA and supported small colonies after the six- and seven-leaf stages, respectively. Contrary to findings of previous studies, DIMBOA does not seem to be the primary factor conditioning resistance to the corn leaf aphid in these inbreds. Journal of economic entomology. Aug 1990. v. 83 (4). p. 1626-1632. Includes references. (NAL Call No.: DNAL 421 J822).

0702

### Relationship between simulated Chinese rose beetle (Coleoptera: Scarabaeidae) feeding and photosynthetic rate reduction.

PHESA. Furutani, S.C. Arita, L.H.; Fuji, J.K. Honolulu, Hawaii : The Society. Proceedings of the Hawaiian Entomological Society. Dec 31, 1990. v. 30. p. 97-104. Includes references. (NAL Call No.: DNAL 420 H312).

0703

### Relationship between weed communities in corn and infestation and damage by the stalk borer (Lepidoptera: Noctuidae).

JESCEP. Pavuk, D.M. Stinner, B.R. Tifton, Ga. : Georgia Entomological Society. Journal of entomological science. Apr 1991. v. 26 (2). p. 253-260. Includes references. (NAL Call No.: DNAL QL461.G4).

0704

### Relationship of adult European corn borer (Lepidoptera: Pyralidae) in action sites with egg masses in the cornfield.

EVETEX. Derrick, M.E. Showers, W.B. Lanham, Md. : Entomological Society of America. A relative sampling method for second flight adult European corn borer, *Ostrinia nubilalis* (Hubner), was used to predict egg mass levels within hybrid seed cornfields (*Zea mays L.*). An aluminum bar (1 m) was swept through adult aggregation areas of giant and green foxtail grass (*Setaria spp.*) and adults were counted as

they flushed from the grass. Numbers of scouted egg masses in the field were regressed onto numbers of flushed adults during early to late silking stages of corn. Egg masses were dependent on the number of European corn borer adults in aggregation areas (example: predicted 0.5 egg masses per corn plant with an average of 52 moths flushed from 10 m<sup>2</sup> grass at 5% silking or an average of 66 moths flushed from 10 m<sup>2</sup> grass at 80% silking). This relationship between flushed adults and egg masses can be used to determine the need and timing of field scouting by consultants or seed companies for second-generation egg masses in the Corn Belt. Environmental entomology. Aug 1990. v. 19 (4). p. 1081-1085. Includes references. (NAL Call No.: DNAL QL461.E532).

0705

### Relationship of plant phenology to corn yield loss resulting from western corn rootworm (Coleoptera: Chrysomelidae) larval injury, nitrogen deficiency, and high plant density.

JEENAI. Spike, B.P. Tollefson, J.J. Lanham, Md. : Entomological Society of America. Relationships among stresses caused by nitrogen deficiency, high plant population levels, and western corn rootworm (WCR) (*Diabrotica virgifera virgifera* LeConte) injury and their effects on phenological development and grain yield of corn (*Zea mays L.*) were determined in a 2-yr field study. WCR infestation did not significantly affect silk development in 1984, although yields were 88.8 and 80.6% of those of the control at densities of 600 and 1,200 eggs per 30.5-cm row, respectively. Effects from root injury appeared to be compounded by moisture-stressed conditions in 1985, and asynchrony between tassel and silk development resulted in increased plant barrenness. Grain yields in 1985 were 80.2 and 55.6% of those of undamaged plants at the 600- and 1,200-egg infestation levels. Evidence from plant density by rootworm interaction on silking interval, barrenness, and yields suggests that the corn plant can tolerate a certain amount of root damage when plant densities are low. A significant nitrogen by rootworm interaction on grain yields provided evidence that root injury interferes with nitrogen uptake. The disruption of phenology of the injured corn plants appeared to be the result of decreased plant turgor resulting from WCR feeding. Journal of economic entomology. Feb 1989. v. 82 (1). p. 226-231. Includes references. (NAL Call No.: DNAL 421 J822).

0706

### Relationship of root ratings, root size, and root regrowth to yield of corn injured by western corn rootworm (Coleoptera: Chrysomelidae).

JEENAI. Spike, B.P. Tollefson, J.J. Lanham, Md. : Entomological Society of America. Root damage ratings are a major method of assessing larval injury to corn roots by corn rootworms. This 2-yr study was conducted to examine the relationships between root ratings, root size,

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root regrowth, and grain yield. Treatments included several nitrogen, plant density, and western corn rootworm infestation levels. Root ratings were not consistent predictors of yield over both years of this study. Yields of plants having root injury were highly variable when agronomic and environmental conditions were favorable for plant growth. Root biomass was a more consistent predictor of grain yield with R<sub>2</sub> of 0.52 and 0.61 in 1984 and 1985, respectively. Root growth (regrowth in infested plants) was quantified in 1985 by subtracting root weights in early July from average weights sampled after regrowth had occurred. During this time period, root growth of noninfested plants was not statistically different than regrowth of infested plants. The interaction between infestation and nitrogen was significant, which indicated that regrowth of damaged roots increased greatly with the application of nitrogen. Regrowth of injured roots also was enhanced in the moderate plant density (63,000 plants per ha) treatment. Grain yields were related to regrowth of injured plants (R<sub>2</sub> of 0.65 and 0.60 at the moderate and high infestation levels, respectively). These results suggest that an index for regrowth should be used when relating root damage to grain yield. *Journal of economic entomology*. Dec 1989. v. 82 (6). p. 1760-1763. Includes references. (NAL Call No.: DNAL 421 J822).

0707

**Relationship of some soil pore parameters to movement of first-instar western corn rootworm (Coleoptera: Chrysomelidae).**  
EVETEX. Gustin, R.D. Schumacher, T.E. Lanham, Md. : Entomological Society of America. The movement of first-instar western corn rootworms, *Diabrotica virgifera virgifera* LeConte, was studied in relation to soil porosity. Movement toward corn roots was restricted to less than 5 cm in soil with a bulk density of 1.1 mg/m<sup>3</sup> and 7% of the soil pores with a diameter greater than 0.30 mm. The distance moved did not increase with time. Movement decreased significantly with distance in continuous artificial pores with a diameter of 0.15 mm. Pores approximating the larvae head-capsule size and larger did not limit larval movement out to 30 cm. Movement toward a host depends on continuity of soil pores. *Environmental entomology*. June 1989. v. 18 (3). p. 343-346. Includes references. (NAL Call No.: DNAL QL461.E532).

0708

**Relationships among ear morphology, western flower thrips, and Fusarium ear rot of corn.**  
PHYTA. Farrar, J.J. Davis, R.M. St. Paul, Minn. : American Phytopathological Society. The relationships among insects, corn (*Zea mays*) ear morphology, and ear rot caused by *Fusarium moniliforme* were studied in 1988 and 1989. Silks on ears of two corn hybrids, one susceptible to Fusarium ear rot and one with an intermediate level of resistance, received applications of the insecticides acephate or

carbaryl at the green silk stage before the onset of ear rot symptoms. In both years, insecticide treatments reduced intra-ear populations of western flower thrips (*Frankliniella occidentalis*) at the brown silk stage and reduced disease incidence at maturity. In 1989, 15 corn hybrids, representing a range of susceptibility to *Fusarium* ear rot, were examined for ear morphology factors that may be correlated with disease incidence. Factors examined were heat units to silking; days from initial green silk to yellow-brown silk and to brown silk stages; intra-ear thrips populations at the green, yellow-brown, and brown silk stages; and husk looseness at the yellow-brown and brown silk stages. Disease incidence was correlated with thrips populations at the brown silk stage and with husk looseness at the brown silk stage but was not correlated with the other factors measured. Hybrids also could be separated by contrast analysis into susceptible, intermediate, and resistant groups on the basis of thrips populations and husk looseness at the brown silk stage. On the basis of these data, intra-ear thrips populations and husk tightness at the brown silk stage are important in the epidemiology of *Fusarium* ear rot. *Phytopathology*. June 1991. v. 81 (6). p. 661-666. Includes references. (NAL Call No.: DNAL 464.8 P56).

0709

**Reproductive condition of female corn earworm (Lepidoptera: Noctuidae) moths from sweep net and blacklight trap collections in corn.**  
EVETEX. Latheef, M.A. Lopez, J.D.; Witz, J.A. Lanham, Md. : Entomological Society of America. The reproductive conditions of female corn earworm, *Heliothis zea* (Boddie), moths caught in blacklight (BL) traps and those captured in sweep nets in corn during 1988 and 1989 were compared. There was no significant difference in mean number of spermatophores per female between moths captured in sweep nets and those caught in BL traps. Number of spermatophores averaged 2.2 per female. The pattern in the number of spermatophores per female over time in corn earworm moths caught in BL traps closely approximated that of females captured in sweep nets. The pattern of change in sex ratio in corn earworm moth catches in BL traps closely approximated that of moths captured in sweep nets, with some exceptions. Profiles describing relative number of chorionated eggs and amount of fat were similar in moths collected by sweep nets and those caught in BL traps. Data indicate that catches in BL traps may be used as an alternative to nocturnal sampling of adults with sweep nets for describing the reproductive condition of female corn earworm moths in corn. *Environmental entomology*. Apr 1991. v. 20 (2). p. 736-741. Includes references. (NAL Call No.: DNAL QL461.E532).

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0710

(NAL Call No.: DNAL S79.E8).

Research advances on European corn borer resistance.

SWORAX. Ferriss, R. Des Plains, Ill. : Scranton Gillette Communications, Inc. Seed world. Dec 1988. v. 126 (13). p. 36-37. (NAL Call No.: DNAL 61.8 SE52).

0711

Residual efficacy of chlorpyrifos 4E applied through a center-pivot irrigation system on European corn borer (Lepidoptera: Pyralidae) larvae.

JEENAI. Currier, D.R. Witkowsky, J.F. Lanham, Md. : Entomological Society of America. Applications of chlorpyrifos 4E through an-overhead center pivot at 1.12 kg (AI)/ha with and without oil (Sunoco 11N) in water volumes of approximately 0.83 cm (1984-1985), 2.03 cm (1984), and 4.82 cm (1985) were compared in bioassays using first-instar European corn borer, *Ostrinia nubilalis* (Hubner). Mortality data were obtained from 24 h bioassays done at four 72-h intervals following insecticide application. During both years, neither irrigation rate nor the addition of oil had a significant effect on efficacy or residual activity of chlorpyrifos when averaged over oil versus nonoil treatments and all irrigation rates respectively. Although not statistically significant, applications with 0.83 cm water without oil resulted in highest mortality, and applications with 2.03 cm (1984) and 4.82 cm (1985) of water with oil resulted in the lowest mortality when averaged over all time periods. Quadratic (1984) and linear (1985) responses over time were observed with all four treatments. Average mortality was 33.9 and 19.9% 12 d after application in 1984 and 1985, respectively. Journal of economic entomology. June 1990. v. 83 (3). p. 1049-1052. Includes references. (NAL Call No.: DNAL 421 J822).

0712

Resistance to first-generation European corn borer (Lepidoptera: Pyralidae) and DIMBOA concentration in midwhorl leaves of the BS9 maize synthetic.

JKESA. Grombacher, A.W. Russell, W.A.; Guthrie, W.D. Lawrence, Kan. : The Society. Journal of the Kansas Entomological Society. Jan 1989. v. 62 (1). p. 103-107. Includes references. (NAL Call No.: DNAL 420 K13).

0713

Resistance to multiple lepidopterous species in tropical derived corn germplasm.

TBMSD. Davis, F.M. Williams, W.P.; Mihm, J.A.; Barry, B.D.; Overman, J.L.; Wiseman, B.R.; Riley, T.J. Mississippi State, Miss. : The Station. Technical bulletin - Mississippi Agricultural and Forestry Experiment Station. Aug 1988. (157). 8 p. ill. Includes references.

0714

Response of corn seedlings to simulated southern corn rootworm (Coleoptera: Chrysomelidae) feeding damage.

JEENAI. Landis, D.A. College Park, Md. : Entomological Society of America. Journal of economic entomology. Aug 1988. v. 81 (4). p. 1209-1213. ill. Includes references. (NAL Call No.: DNAL 421 J822).

0715

Response of corn to artificial infestation with fall armyworm and southwestern corn borer larvae.

SENTD. Williams, W.P. Davis, F.M. College Station, Tex. : Southwestern Entomological Society. The Southwestern entomologist. June 1990. v. 15 (2). p. 163-166. Includes references. (NAL Call No.: DNAL QL461.S65).

0716

Response of starch-encapsulated *Bacillus thuringiensis* containing ultraviolet screens to sunlight.

EVETEX. Dunkle, R.L. Shasha, B.S. Lanham, Md. : Entomological Society of America. Formulations of *Bacillus thuringiensis* Berliner spores and crystals, encapsulated together within a starch matrix containing no ultraviolet screens, lost all spore viability and insecticidal activity against the European corn borer, *Ostrinia nubilalis* (Hubner), within 4 d. Encapsulated crystals and spores with Congo red or folic acid as screens exhibited moderate spore viability and retained at least 50% of their original toxicity after 12 d. Congo red was the most effective protectant, followed by folic acid and para amino benzoic acid. Because *Bacillus thuringiensis* is likely sensitive to the entire ultraviolet-component in sunlight, ability to provide broad-band ultraviolet protection is required to prolong insecticidal activity effectively. Environmental entomology. Dec 1989. v. 18 (6). p. 1035-1041. Includes references. (NAL Call No.: DNAL QL461.E532).

0717

Response of two maize synthetics to recurrent selection for resistance to first-generation European corn borer (Lepidoptera: Pyralidae) and Diplodia stalk rot.

JEENAI. Nyhus, K.A. Russell, W.A.; Guthrie, W.D. Lanham, Md. : Entomological Society of America. Journal of economic entomology. Includes statistical data. Dec 1988. v. 81 (6). p. 1792-1798. Includes references. (NAL Call No.: DNAL 421 J822).

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18

response of western corn rootworm-infested corn to nitrogen fertilization and plant density. RPSAY. Spike, B.P. Tollefson, J.U. Madison, Wis. : Crop Science Society of America. Growth response of corn (*Zea mays L.*) to corn rootworm (*Diabrotica* spp.) infestation is poorly understood and may be influenced by management practices and environmental conditions. The objectives of this 2-yr experiment were to determine the effect of three N rates (0, 168, and 336 kg ha<sup>-1</sup>) and three plant density treatments (39 000 in 1984 only, 63 000, and 87 000 plants ha<sup>-1</sup> on dry-matter accumulation and partitioning of corn plants infested with three levels of western corn rootworm (WCR, *Diabrotica virgifera* LeConte) 0, 1967, and 334 eggs m<sup>-1</sup> row. Plant dry weight taken periodically and subdivided into vegetative and reproductive fractions, was used to calculate the harvest index and mean relative growth rates (Rt). In 1985, leaf area was measured and leaf area index (LAI), mean net assimilation rate (NAR), and leaf area ratio (LAR) were calculated. In 1985, a dry year, rootworm-injured plants had significantly reduced dry weight, leaf area, harvest index, LAI, and NAR. Dry-matter accumulation of injured plants was greater in low plant-density and applied-N treatments. In comparison with parameters of healthy plants, dry weight, Rt, and NAR of injured plants were reduced in high-N treatments at the time of rootworm feeding. This significant rootworm X N interaction did not occur after feeding ceased. Rootworm infestation significantly reduced the harvest index only in 1985, suggesting that dry conditions increase the impact of root injury on ear development and yields. Crop science. May/June 1991. v. 31 (3). p. 776-785. Includes references. (NAL Call No.: DNAL 64.8 C883).

19

Rootworm and mechanical damage effects on root morphology and water relations in maize. RPSAY. Riedell, W.E. Madison, Wis. : Crop Science Society of America. There is little information in the literature concerning the effect of corn rootworm larval feeding on the physiology of maize (*Zea mays L.*). This study was conducted to determine if root damage caused by western corn rootworms (*Diabrotica virgifera virgifera* LeConte) affects relative water content, leaf water potential, or stomatal conductance in leaves of the host plants. The effect of mechanical root-cutting treatments was also evaluated. The experiment was conducted under controlled-environment conditions in a greenhouse. Plants were damaged at the V9 stage of leaf development by prior infestation with 50 or 150 larvae per plant or by cutting 25 or 75% of the root system from the plant. Root systems and plant water relations were evaluated at this stage of development and again at tassel. Larval root damage was confined to the axes of the fourth and fifth nodes of roots. There were no differences in relative water content, leaf water potential, or stomatal conductance between infested plants or controls at V9, at

tassel, however, leaf water potential was significantly higher and stomatal conductance was significantly less in infested plants ( $P < 0.05$ ). Mechanical cutting of roots caused significant differences ( $P < 0.05$ ) in relative water content and stomatal conductance at both sampling dates. These results indicate that mechanical root damage reduced the ability of root systems to provide adequate water to the shoots to a much greater extent than did corn-rootworm damage. Crop science. May/June 1990. v. 30 (3). p. 628-631. illl. Includes references. (NAL Call No.: DNAL 64.8 C883).

0720

### Scouting corn in North Carolina.

Linker, H.M. Van Duyn, J.W.; Anderson, J.R. Jr.; Lewis, W.M. Raleigh, N.C. : The Service. AG - North Carolina Agricultural Extension Service, North Carolina State University. May 1990. (399). 11 p. (NAL Call No.: DNAL S544.3.N6N62).

0721

### Screening for phyto-protectants to guard corn seeds/seedlings from southern corn rootworm feeding injury.

JESCEP. Landis, D.A. Gould, F. Tifton, Ga. : The Entomological Science Society. Journal of entomological science. July 1988. v. 23 (3). p. 201-211. illl. Includes references. (NAL Call No.: DNAL QL461.G4).

0722

### Seasonal incidence of fall armyworm (*Lepidoptera: Noctuidae*) pupal parasitism in corn by *Diapetimorpha introita* and *Cryptus albitarsis* (*Hymenoptera: Ichneumonidae*).

JESCEP. Pair, S.D. Gross, H.R. Tifton, Ga. : Georgia Entomological Society. Journal of entomological science. July 1989. v. 24 (3). p. 339-343. Includes references. (NAL Call No.: DNAL QL461.G4).

0723

### Seasonal occurrence of *Beauveria bassiana* in the southwestern corn borer (*Lepidoptera: Pyralidae*) in the Texas High Plains.

JKESA. Knutson, A.E. Gilstrap, F.E. Lawrence, Kan. : The Society. Journal of the Kansas Entomological Society. Apr 1990. v. 63 (2). p. 243-251. Includes references. (NAL Call No.: DNAL 420 K13).

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0724

**Seasonal occurrence of Spodoptera frugiperda larvae on certain host plants in Louisiana.**  
JESCEP. Fuxa, J.R. Tifton, Ga. : Georgia Entomological Society. Journal of entomological science. July 1989. v. 24 (3). p. 277-289. Includes references. (NAL Call No.: DNAL QL461.G4).

QL461.E532).

0725

**Seasonal progress of Nosema pyrausta in the European corn borer, Ostrinia nubilalis.**  
JIVPA. Siegel, J.P. Maddox, J.V.; Ruesink, W.G. Duluth, Minn. : Academic Press. Journal of invertebrate pathology. July 1988. v. 52 (1). p. 130-136. Includes references. (NAL Call No.: DNAL 421 J826).

0728

**Seedling stage feeding by corn leaf aphid (Homoptera: Aphididae): influence on plant development in maize.**

JEENAI. Bing, J.W. Guthrie, W.D.; Dicke, F.F.; Obrycki, J.J. Lanham, Md. : Entomological Society of America. Five maize (*Zea mays L.*) inbred lines (B37, B73, C103, Mo17, and B96 41:2504B) were infested with alate corn leaf aphids, *Rhopalosiphum maidis* (Fitch), in the greenhouse, and then transplanted to the field to quantify the effects of seedling feeding. Feeding by corn leaf aphids on coleoptile and two-leaf stage plants delayed plant development; plant height was reduced, and pollen shed and silking were delayed. Grain fill was also lower for plants infested in the coleoptile, two-leaf, and four-leaf stages compared with uninfested plants. Aphid feeding reduced grain-fill ratings in inbreds B37, C103, and B96, but did not reduce grain fill in B73 and Mo17. Alate corn leaf aphid feeding on seedling maize can affect plant development and grain fill later in the season. Journal of economic entomology. Apr 1991. v. 84 (2). p. 625-632. Includes references. (NAL Call No.: DNAL 421 J822).

0726

**Seasonal responses of corn rootworm beetles (Coleoptera: Chrysomelidae) to non-pheromonal attractants.**  
JESCEP. Lance, D.E. Elliott, N.C. Tifton, Ga. : Georgia Entomological Society. Journal of entomological science. Jan 1991. v. 26 (1). p. 188-196. Includes references. (NAL Call No.: DNAL QL461.G4).

0729

**Semiochemical-insecticidal bait placement and vertical distribution of corn rootworm (Coleoptera: Chrysomelidae) adults: implications for management.**

EVETEX. Weissling, T.J. Meinke, L.J. Lanham, Md. : Entomological Society of America. Experiments were conducted in 1988 and 1989 to determine the effect and potential interaction of height of semiochemical-insecticide bait placement and within-canopy adult corn rootworm vertical distribution on beetle mortality in baited traps. Results of an experiment utilizing semiochemical-insecticide baited traps, and unbaited yellow sticky traps placed in a corn (*Zea mays L.*) field at 0 m and corn ear height indicated that *D. virgifera virgifera* LeConte mortality was significantly higher at ear height baited traps. In addition, more *D. v. virgifera* females were distributed near ear height than at 0 m. Results of subsequent experiments with baited, and unbaited traps placed at 0, 0.6, 1.2, 1.8, and 2.4-m height intervals within the canopy indicated that efficacy of starch baits increases with height of bait placement and the vertical distribution of corn rootworm beetles interacts with height of semiochemical-insecticide bait placement. Data from all experiments strongly indicate that semiochemical-insecticide granules placed at ground level will not effectively attract and kill female *D. v. virgifera* beetles. To optimize the effectiveness of corn rootworm semiochemical-insecticide baits, application of formulations should be restricted as much as possible to regions at or above the ear. Formulations need to be developed that will

0727

**Seasonality in the hourly reproductive behavior of adult Agrotis ipsilon (Lepidoptera: Noctuidae) in Iowa.**  
EVETEX. Kaster, L.V. Showers, W.B.; Mulder, P.G. Lanham, Md. : Entomological Society of America. Hourly captures of male black cutworms, *Agrotis ipsilon* (Hufnagel), in traps baited with different ages of virgin females (2, 4, 6, and 8 d) were examined during three phases of phenology in Iowa: migration-infestation, early postinfestation, and mid-postinfestation. Six-d-old virgin females captured the most males during migration-infestation, whereas traps using 4-d-old females, although not statistically significant, captured the most males during early postinfestation. Two factors, greater capture rate and longer capture period, were responsible for the enhanced attractiveness of 6-d-old females during migration-infestation. Only capture rate contributed to increased attractiveness of 4-d-old females during early postinfestation. Trap captures during mid-postinfestation were extremely low despite active calling by females and possibly reflected the beginning of reproductive diapause in males. Nocturnal rhythms of capture were similar across virgin female ages and seasons. Likewise, comparisons with a trap baited with synthetic pheromone revealed similarities that suggest that the nightly rhythm of mating activities is mediated primarily by the male. Environmental entomology. Aug 1989. v. 18 (4). p. 674-677. Includes references. (NAL Call No.: DNAL

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adhere to plants at the time of application. Environmental entomology. June 1991. v. 20 (3). p. 945-952. Includes references. (NAL Call No.: DNAL QL461.E532).

0730

A simple, effective, and low-cost method for mass marking adult western corn rootworms (Coleoptera, Chrysomelidae). JESCEP. Oloumi-Sadeghi, H. Levine, E. Tifton, Ga. : Georgia Entomological Society. Journal of entomological science. Jan 1990. v. 25 (1). p. 170-175. Includes references. (NAL Call No.: DNAL QL461.G4).

0731

Simulation model of the population dynamics of *Ostrinia nubilalis* (Lepidoptera: Pyralidae) in maize. EVETEX. Onstad, D.W. Lanham, Md. : Entomological Society of America. A detailed mathematical model of *Ostrinia nubilalis* (Hubner) in maize, *Zea mays* L., was created for use in ecological studies. Validation results indicated that the model predicts long-term population dynamics and within-season survival relatively well. For other processes, validation results were mixed, with the best fits occurring when diapause induction was modeled accurately. The results demonstrated the importance of natural enemies, temperature, and photoperiod (latitude) to population dynamics. This simulation model is an adequate first step in the creation of a comprehensive explanatory model that can be used to guide experimentation and explore ecological principles. Environmental entomology. Dec 1988. v. 17 (6). p. 969-976. Includes references. (NAL Call No.: DNAL QL461.E532).

0732

Sorghum-corn-Johnsongrass and banks grass mite: a model for biological control in field crops. Gilstrap, F.E. Boulder : Westview Press, 1988. The Entomology of indigenous and naturalized systems in agriculture / edited by Marvin K. Harris and Charles E. Rogers. p. 141-159. Includes references. (NAL Call No.: DNAL SB931.E57).

0733

Soybean yield responses and intraspecific competition from simulated seedcorn maggot injury. AGJOAT. Higley, L.G. Pedigo, L.P. Madison, Wis. : American Society of Agronomy. The reproductive and competitive responses of plants to early season stresses are not well known. In field experiments from 1983 to 1986 we examined these effects for one system; simulated seedcorn maggot (SCM), *Delia platura* (Diptera: Anthomyiidae) injury to soybean,

*Glycine max* (L.) Merr. Injury included different plant densities (simulating stand reductions) and different ratios of plumule-injured to uninjured plants (simulating different levels of plumule destruction). Our objectives were to describe (i) how simulated SCM injury affected total yield, yield components, and intraspecific competition between injured and uninjured plants, and (ii) to determine the value of the replacement series experimental design for examining intraspecific competition from injury. Plant density did not influence plot yields but did affect yield components of injured and uninjured plants. The proportion of injured to uninjured plants influenced plot yields in 1983 and 1984 but not in 1985 or 1986. Uninjured soybean were much stronger competitors than injured soybean. Yield reductions of injured plants were attributable to competition from uninjured plants. Specifically, competition seemed to increase shading and reduce assimilate availability of injured plants. The replacement series design was a powerful technique for describing intraspecific competition arising from insect injury. Agronomy journal. Jan/Feb 1991. v. 83 (1). p. 135-139. Includes references. (NAL Call No.: DNAL 4 AM34P).

0734

Spatial and temporal dynamics of animals and the host-density threshold in Epizootiology. JIVPA. Onstad, D.W. Maddox, J.V.; Cox, D.J.; Kornkven, E.A. Duluth, Minn. : Academic Press. Journal of invertebrate pathology. Jan 1990. v. 55 (1). p. 76-84. 111. Includes references. (NAL Call No.: DNAL 421 J826).

0735

Spread of maize chlorotic dwarf virus in maize fields by its leafhopper vector, *Graminella nigrifrons*. PHYTA. Madden, L.V. Knoke, J.K.; Louie, R. St. Paul, Minn. : American Phytopathological Society. Adult leafhoppers of *Graminella nigrifrons*, given a 2-day acquisition access period to maize chlorotic dwarf virus (MCDV), were released in the center of maize plots planted in early May (1985 and 1986) or in late June to early July (1984-1986). Disease incidence ( $y$ ) was assessed at least twice after insect release and represented as the proportion of plants infected by MCDV in successive 80-cm wide annuli from the source. Disease gradients were best described by the log-logistic model, i.e., logit of  $y$  versus  $\ln(\text{distance})$  was a straight line. The model indicated that the rate of spread was proportional to  $y$ ,  $1 - y$ , and  $1/\text{distance}$ . The spread parameter ( $b$ ), a measure of the gradient steepness and slope of the linearized model, ranged from 1.3 for the early planting in 1985 to 2.0 for the late planting in 1984. In 1984 and the early plantings of 1985 and 1986, there was little change in  $b$  over time. In the late plantings, however,  $b$  increased (indicating steeper gradients) between 14 and 21 days after

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release. At approximately 21 days after release, the distance at which  $y$  declined to 0.10 (10%) ranged from 124 to 525 cm. The rates of increase in  $y$  over time for the entire plots and at selected distances from the release point were measured using the apparent infection rate ( $r$ ). There was no discernible effect of distance from the source on  $r$ . The  $r$  parameter consistently declined over time. Results indicate that MCDV spread can be substantial when viruliferous leafhoppers are introduced into a field of susceptible maize. *Phytopathology*. Mar 1990. v. 80 (3). p. 291-298. Includes references. (NAL Call No.: DNAL 464.8 P56).

0736

**Stadia, larval-pupal weight, and width of head capsules of corn earworm (Lepidoptera: Noctuidae) after feeding on varying resistance levels of maize silks.**

JESCEP. Wiseman, B.R. Isenhour, D.J.; Bhagwat, V.R. Tifton, Ga. : Georgia Entomological Society. *Journal of entomological science*. July 1991. v. 26 (3). p. 303-309. Includes references. (NAL Call No.: DNAL QL461.G4).

0737

**Stylet penetration and feeding sites on Rhopalosiphum maidis (Homoptera: Aphididae) on two growth stages of maize.**

AESAAI. Bing, J.W. Novak, M.G.; Obryckie, J.J.; Guthrie, W.D. Lanham, Md. : The Society. *Annals of the Entomological Society of America*. Sept 1991. v. 84 (5). p. 549-554. Includes references. (NAL Call No.: DNAL 420 EN82).

0738

**Suitability of corn growth models for incorporation of weed and insect stresses.**

AGJOAT. Retta, A. Vanderlip, R.L.; Higgins, R.A.; Moshier, L.J.; Feyerherm, A.M. Madison, Wis. : American Society of Agronomy. Shattercane *Sorghum bicolor* (L.) Moench and second generation European corn borer (ECB) *Ostrinia nubilalis* (Hubner) are pests that singly or in combination reduce corn (*Zea mays* L.) production in the northcentral regions of the USA. Shattercane reduces corn growth and yield because it competes effectively with corn for light and water. Second generation ECB larvae, in tunneling through the vascular system, apparently affect yield by disrupting water and photosynthate movements. Pest models may be linked to physiological models for assessing the effects of pest stresses on corn growth and yield. CERES-Maize and CORNF corn growth models were chosen to test accuracy and consistency in predicting corn growth and yield parameters. The objectives were to evaluate corn growth models to which pest models could be attached and to test the sensitivity of the selected model to variations in light and water. Simulated leaf area index; vegetative, grain, and total biomass; and yield components

were compared to measured data. CERES-Maize modified for leaf growth and phenology computations (VO/SAT) gave more accurate predictions of date of silking (bias = 1 d) than CORNF (bias = 6 d) or original version CERES-Maize (bias = -5 d). Accurate estimation of phenology is important because the severity of yield reduction from ECB infestation is dependent on the stage of growth. Sensitivity of VO/SAT to reductions in light and water inputs was tested by simulating combinations of light and water levels ranging from 50 to 100% of actual. A 50% reduction in light resulted in average reductions of 26% in yield, 16% in kernel weight, 16% in kernel number, and 20% in leaf area index. Similarly, a 50% reduction in precipitation resulted in average reductions of 47% in yield, 51% in kernel weight, 1% in kernel number, and 1% in leaf area index. The combination model showed adequate sensitivity to light and water, and thus could be modified to mimic weed competition. *Agronomy journal*. July/Aug 1991. v. 83 (4). p. 757-765. Includes references. (NAL Call No.: DNAL 4 AM34P).

0739

**Suitability of corn insect pests for development and survival of Chrysoperla carnea and Chrysopa oculata (Neuroptera: Chrysopidae).**

EVETEX. Obryckie, J.J. Hamid, M.N.; Sajap, A.S.; Lewis, L.C. Lanham, Md. : Entomological Society of America. Immature development of the common green lacewing, *Chrysoperla* (=*Chrysopa*) *carnea* Stephens, requires 20.5, 21.6, and 24.9 d at 27 degrees C with a photoperiod of 16:8 (L:D), when fed *Ostrinia nubilalis* (Hubner) (European corn borer) eggs, *Agrotis ipsilon* Hufnagel (black cutworm) eggs, and *A. ipsilon* neonates, respectively. Twenty-six to 40% of the individuals died when reared on eggs, 65% died when reared on *A. ipsilon* neonates, and all died when fed *O. nubilalis* neonates. Mortality of *Chrysoperla carnea* larvae on *O. nubilalis* neonates was due to entanglement in the silk produced by these larvae. An average of 377 +/- 7 *O. nubilalis* eggs, 641 +/- 43 *A. ipsilon* eggs, and 2,056 +/- 148 *A. ipsilon* neonates were preyed upon by *Chrysoperla carnea* during larval development. *Chrysoperla carnea* and *Chrysopa oculata* Say first instars were unable to survive on stalk borer, *Papaipema nebris* (Guenee), eggs. More than 80% of *Chrysopa oculata* larvae, reared on corn leaf aphids, *Rhopalosiphum maidis* (Fitch), as first and second instars and then switched to *P. nebris* eggs died as third instars, whereas only 30% of similarly reared *Chrysoperla carnea* third instars died. The most suitable prey, resulting in the fastest development with highest survival, for *Chrysoperla carnea* were *O. nubilalis* and *A. ipsilon* eggs; *R. maidis* was most favorable for *Chrysopa oculata*. *Environmental entomology*. Dec 1989. v. 18 (6). p. 1126-1130. Includes references. (NAL Call No.: DNAL QL461.E532).

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0740

Suitability of three prey species for Nearctic populations of *Coccinella septempunctata*, *Hippodamia variegata*, and *Propylea quatuordecimpunctata* (Coleoptera: Coccinellidae).

JEENAI. Obrychi, J.J. Orr, C.J. Lanham, Md. : Entomological Society of America. *Coccinella septempunctata* L. larvae reared at 23 +/- 2 degrees C (16:8 L:D) on pea aphids, *Acyrthosiphon pisum* (Harris), required an average of 13.1 d to complete development, a significantly faster rate of development than observed on corn leaf aphids, *Rhopalosiphum maidis* (Fitch) (16 d). Adult *C. septempunctata* from larvae reared on *A. pisum* were larger and weighed more than adults reared on *R. maidis*. Developmental times of Nearctic *Hippodamia variegata* Goeze and *Propylea quatuordecimpunctata* L., were not influenced by larval prey, but adult *P. quatuordecimpunctata* were heavier and larger when reared on *A. pisum*. First instars of the three coccinellid species tested did not feed on European corn borer eggs, *Ostrinia nubilalis* (Hubner) and desiccated within 3 d at 23 degrees C. *A. pisum* is a highly suitable larval prey for Nearctic populations of these predators; redistribution program releases in alfalfa infested with *A. pisum* are appropriate. In corn, these coccinellids can develop on *R. maidis*, but first instars cannot utilize *O. nubilalis* eggs as an alternate food source. *Journal of economic entomology*. Aug 1990. v. 83 (4). p. 1292-1297. Includes references. (NAL Call No.: DNAL 421 J822).

*Ostrinia nubilalis* tunneling in plants. In 1989, when environmental conditions were more conducive to fungal growth, tunneling was significantly greater in the control plants, followed by the injected and foliarly treated plants. When applied to foliage, *B. bassiana* provided the greatest amount of *O. nubilalis* suppression. The entomopathogenic fungus colonized the corn plant at whorl stage, moved within the plant, and persisted to provide season-long suppression of *O. nubilalis*. *Environmental entomology*. Aug 1991. v. 20 (4). p. 1207-1211. Includes references. (NAL Call No.: DNAL QL461.E532).

0743

Survey of entomopathogenic fungi naturally infecting cereal aphids (Homoptera: Aphididae) of irrigated grain crops in southwestern Idaho. EVETEX. Feng, M.G. Johnson, J.B.; Kish, L.P. Lanham, Md. : Entomological Society of America. *Environmental entomology*. Oct 1990. v. 19 (5). p. 1534-1542. ill. Includes references. (NAL Call No.: DNAL QL461.E532).

0744

Survival of starved neonate larvae of *Diabrotica virgifera virgifera* LeConte (Coleoptera: Chrysomelidae).

JKESA. Branson, T.F. Lawrence, Kan. : The Society. *Journal of the Kansas Entomological Society*. Oct 1989. v. 62 (4). p. 521-523. Includes references. (NAL Call No.: DNAL 420 K13).

0741

Summer 1991 to be the worst ever for flea beetles and Stewart's Wilt.

Gauthier, N.L. Storrs, Conn. : Coop. Ext. Serv., USDA, College of Agriculture & Natural Resources, Univ. of Conn. The Grower : vegetable and small fruit newsletter. Apr 1991. v. 91 (4). p. 1-2. (NAL Call No.: DNAL SB321.G85).

0745

Survival time of unfed, first-instar western corn rootworm (Coleoptera: Chrysomelidae) and the effects of soil type, moisture, and compaction on their mobility in soil.

EVETEX. Macdonald, P.J. Ellis, C.R. Lanham, Md. : Entomological Society of America. If soil factors at the time of hatch significantly influence the survival time of newly eclosed rootworm larvae or their ability to move through the soil to host roots, monitoring significant factors may provide an opportunity to improve predictions of economic damage. Survival time of *Diabrotica virgifera virgifera* LeConte was reduced at less than 100% RH and as temperature increased. Larvae moved farthest in loam soil with 24 and 30% moisture (-0.38 and -0.13 bars). Movement was restricted in wet soil (36%, or -0.05 bar) and in soil with 18% moisture or less. Larvae moved more than three times farther through silty clay or loam than through loamy sand. Movement through loam soil at a matric potential -0.38 bar was unaffected by bulk densities of 1.2 to 1.8 g/cc, and at least 5% of larvae moved to the farthest section of the test chamber at all bulk densities within 6 h under these conditions. Larvae survived for sufficient time in the soil to reach roots under most soil conditions. When soil is very wet or dry, increased mortality or

0742

Suppression of *Ostrinia nubilalis* (Hubner) (Lepidoptera: Pyralidae) by endophytic *Beauveria bassiana* (Balsamo) Vuillemin. EVETEX. Bing, L.A. Lewis, L.C. Lanham, Md. : Entomological Society of America. The ubiquitous entomopathogenic fungus *Beauveria bassiana* (Balsamo) Vuillemin was applied to whorl-stage corn plants, *Zea mays* L., by foliar application of a granular formulation of conidia and by injection of a conidial suspension. Plants were analyzed at harvest for presence of *B. bassiana* and for the amount of tunneling by laboratory-reared European corn borer larvae, *Ostrinia nubilalis* (Hubner). In 1989, 98.3% of the foliarly treated plants, 95.0% of the injected plants, and 33.3% of the nontreated plants were colonized by *B. bassiana* at harvest. In 1988, there were no significant differences between treatment effects on *O.*

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decreased movement can reduce larval establishment. Environmental entomology. June 1990. v. 19 (3). p. 666-671. Includes references. (NAL Call No.: DNAL QL461.E532).

0748

**Susceptibility and immune response of western corn rootworm larvae (Coleoptera: Chrysomelidae) to the entomogenous nematode, Steinernema feltiae (Rhabditida: Steinernematidae).**

JEENAI. Jackson, J.J. Brooks, M.A. Lanham, Md. : Entomological Society of America. Susceptibility of third-instar western corn rootworms, *Diabrotica virgifera virgifera* LeConte, to the Agriotos, All, Breton, and Mexican strains of the entomogenous nematode *Steinernema feltiae* was compared based on concentration-mortality regressions. Larvae were most susceptible to the Mexican strain, less susceptible to the Agriotos and Breton strains, and least susceptible to the All strain. The Mexican strain was 22 times more virulent than the All strain. Rootworm larvae encapsulated invading nematodes of all strains, but the frequency of encapsulation was lower for the Mexican and Agriotos strains. Apparently, the defensive response of encapsulation had only a minor effect on larval susceptibility. Frequency of encapsulation and larval susceptibility were not consistently related. Journal of economic entomology. Aug 1989. v. 82 (4). p. 1073-1077. Includes references. (NAL Call No.: DNAL 421 J822).

0747

**Synergistic and antagonistic responses of soil insecticide-herbicide combinations for corn rootworm, *Diabrotica* spp. control.**  
JPFC2. Reed, J.P. Keaster, A.J.; Kremer, R.J.; Krause, G.F. New York, N.Y. : Marcel Dekker. Journal of environmental science and health : Part B : Pesticides, food contaminants, and agricultural wastes. 1989. v. 24 (4). p. 325-334. Includes references. (NAL Call No.: DNAL TD172.J61).

0748

**Synthetic pheromone 8-methyl-2-decanol propanoate.**  
Guss, P.L. Tumlinson, J.H. III; Sonnet, P.E.; Proveaux, A.T. Washington, D.C. : The Department. A pheromonal compound produced by the western corn rootworm has been identified as 8-methyl-2-decanol propanoate (8-M-2-DP) having the structural formula. A synthesis has been devised for racemic 8-M-2-DP which demonstrates activity toward the western corn rootworm comparable to its natural counterpart. Other diabroticites including the Mexican corn rootworm and the northern corn rootworm also respond to the synthetic compound. By attracting rootworms to field traps, 8-M-2-DP is a useful tool for the monitoring and control of these major agricultural pests. United

States Department of Agriculture patents. Copies of USDA patents are available for a fee from the Commissioner of Patents and Trademarks, U.S. Patents and Trademarks Office, Washington, D.C. 20231. Mar 29, 1988. (4,734,S24). 1 p. Includes references. (NAL Call No.: DNAL aT223.V4A4).

0749

**Temperature-dependent development of immature stages of the western corn rootworm, *Diabrotica virgifera virgifera* (Coleoptera: Chrysomelidae).**

EVETEX. Jackson, J.J. Elliot, N.C. College Park, Md. : Entomological Society of America. Larval and pupal development of western corn rootworm was studied at eight constant temperatures ranging from 15 to 33 degrees C. Development from hatch to adult stage occurred at 15-31.5 degrees C; no larvae completed the second stage at 33 degrees C. Adult survival decreased and wing deformities increased significantly at 15 and 31.5 degrees C. Optimum development and survival occurred within the temperature range of 21-30 degrees C. Males developed faster than females in all stages at temperatures from 18-30 degrees C, but the sexes have a similar lower thermal threshold of development estimated to be near 9 degrees C. The relationship between developmental rate and temperature was described for both sexes in all stages using linear and nonlinear equations. The information presented will facilitate the development of phenological models for this important pest species. Environmental entomology. Apr 1988. v. 17 (2). p. 166-171. Includes references. (NAL Call No.: DNAL QL461.E532).

0750

**Temperature-dependent model for predicting emergence of adult southwestern corn borer (Lepidoptera: Pyralidae) in Texas.**  
JEENAI. Knutson, A.E. Jackman, J.A.; Cronholm, G.B.; Ng, S.S.; Davis, F.M.; Morrison, W.P. Lanham, Md. : Entomological Society of America. A temperature-dependent model designed to predict emergence of first-generation adult southwestern corn borer, *Diatraea grandiosella* Dyar, was developed and validated. Thermal unit requirements were determined for larval, prepupal, and pupal development for nondiapause southwestern corn borer at three constant temperatures. Data input to the model were average daily mean maximum and minimum temperatures and the age class (instar) distribution of field-collected larvae. Model predictions agreed closely with observed adult emergence during 4 yr of field validation. Fifty to 69% of the predicted dates were within +/- 2 d of the observed emergence date for 5, 25, and 50% adult emergence. Application of the developmental model to an integrated pest management program for corn is discussed. Journal of economic entomology. Aug 1989. v. 82 (4). p. 1230-1236. Includes references. (NAL Call No.: DNAL 421 J822).

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0751

**Temporal occurrence of the variegated cutworm (Lepidoptera: Noctuidae) adults in Iowa with evidence for migration.**  
EVETEX. Buntin, G.D. Pedigo, L.P.; Showers, W.B. Lanham, Md. : Entomological Society of America. Adult activity and ovarian dynamics of the variegated cutworm, *Peridroma saucia* (Hubner), were studied during 3 yr by using blacklight traps. Initial mating in females coincided with ovarian development, with females continuing to mate up to six times during their lives. Adult catches, ovarian dynamics, and degree-day calculations indicated that *P. saucia* has three generations each year in Iowa. Very few preovipositional females were collected during the spring flight. This observation and the strong association of adult activity during the spring with weather patterns resulting in southerly winds suggested that *P. saucia* adults migrate into the state each spring when weather conditions are favorable. Flights during June through November contained a large portion of preovipositional females. Degree-day calculations also revealed that adults collected during June and July were the progeny of spring migrants, but temporally distinct influxes of migrants may produce distinct peaks of adult activity during June and July. Degree-day calculations and the collection of a few preovipositional females during the spring suggested that *P. saucia* may overwinter as pupae, which may produce adults that contribute to the influx of migrants in the spring. Environmental entomology. June 1990. v. 19 (3). p. 603-608. Includes references. (NAL Call No.: DNAL QL461.E532).

0752

**The tobacco budworm/bollworm complex (Lepidoptera: Noctuidae) and its parasites on field crops in South Carolina.**

Manley, D.G. DuRant, J.A.; Johnson, A.W.; Roof, M.E. Clemson, S.C. : South Carolina Entomological Society. Journal of agricultural entomology. July 1991. v. 8 (3). p. 169-178. Includes references. (NAL Call No.: DNAL SB599.J69).

0753

**Toxicity of naturally occurring levels of the *Penicillium* mycotoxins citrinin, ochratoxin A, and penicillic acid to the corn earworm, *Heliothis zea*, and the fall armyworm, *Spodoptera frugiperda* (Lepidoptera: Noctuidae).**  
EVETEX. Dowd, P.F. Lanham, Md. : Entomological Society of America. The oral toxicity of the *Penicillium* mycotoxins, alone and in combination, to *Heliothis zea* (Boddie) and *Spodoptera frugiperda* (J. E. Smith) at naturally occurring levels was evaluated. Ochratoxin A and citrinin were the most toxic alone to both insect species and caused abnormalities in the Malpighian tubules. The combination of ochratoxin A and penicillic acid was synergistically most toxic to *H. zea*, whereas the combination of ochratoxin A and

citrinin was synergistically most toxic to *S. frugiperda*. The production of frequently found combinations of mycotoxins by *Penicillium* fungi likely to be encountered by these insects is discussed in relation to the results obtained. Environmental entomology. Feb 1989. v. 18. p. 24-29. 111. Includes references. (NAL Call No.: DNAL QL461.E532).

0754

**Tractor-mounted rotary dispenser for artificially infesting whorl-stage corn with larvae of *Spodoptera frugiperda* (Lepidoptera: Noctuidae).**

JEENAI. Sumner, H.R. Gross, H.R. Lanham, Md. : Entomological Society of America. A rotating dispenser system for artificially infesting whorl-stage corn (*Zea mays* L.) with larvae of the fall armyworm, *Spodoptera frugiperda* (J. E. Smith), was designed, developed, and evaluated. The system uniformly dispenses larvae up to a density averaging 76 larvae per g of corncob grits, while rotating at 75 rpm. The mortality of larvae tumbled in the hopper with grits was higher than the mortality of those not tumbled, but mortality did not differ significantly among larvae tumbled for 3, 10, or 20 min. Following application, the mean number of larvae recovered per plant, the mean percentage of plants infested, the mean percentage of plants infested with multiple larvae, and the mean percentage of damaged plants increased progressively and significantly as the density of dispensed fall armyworm larvae was increased from 1 to 16 per plant. The application system probably can be used to convey the larvae of numerous lepidopterous species on a variety of row crops and also may be adaptable for use in the augmentation of biological control agents. Journal of economic entomology. June 1991. v. 84 (3). p. 1010-1014. Includes references. (NAL Call No.: DNAL 421 J822).

0755

**Transmission of *Nosema pyrausta* in adult European corn borers.**

JIVPA. Solter, L.F. Maddox, J.V.; Onstad, D.W. Duluth, Minn. : Academic Press. The microsporidium *Nosema pyrausta* causes a chronic disease in the European corn borer, *Ostrinia nubilalis*. This disease may be important in the natural regulation of this pest. We performed two studies to investigate transmission of the disease in adult European corn borers. In the first study, adult corn borers became infected when spores were ingested via a water/food source. In the second study, uninfected females and their offspring rarely became infected after the females mated with infected males; however, other sources of contamination could be implicated when infection did occur. We determined that infected males mated as effectively as uninfected males and produced offspring. Levels of infection, however, may influence these capabilities. Journal of invertebrate pathology. Mar 1991. v. 57 (2). p. 220-226. Includes references. (NAL Call No.: DNAL 421 J826).

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0756

### Trap comparisons and behavioral observations for the male southwestern corn borer (Lepidoptera: Pyralidae).

JEENAI. Goodenough, J.L. Knutson, A.E.; Davis, F.M. Lanham, Md. : Entomological Society of America. Captures of male southwestern corn borer, *Diatraea grandiosella* (Dyar), were significantly higher in an International Pheromone Systems (IPS) trap than in any of three sizes of wire cone traps or in a cylindrical trap. Observations of moths with night vision-amplifying goggles verified the high attractiveness of the pheromone lure and revealed sustained direct lure contact by male moths. The IPS trap appeared to be most suitable to integrated pest management programs because of its high catch, economy, ease of service and transport, and apparent durability. *Journal of economic entomology*. Oct 1989. v. 82 (5). p. 1460-1465. ill. Includes references. (NAL Call No.: DNAL 421 J822).

serologically unrelated to the noncapsid protein of maize stripe virus (MStV). Crude extracts from infected leaves did not react with antisera to the capsid protein of MStV or to several other maize viruses and spiroplasma in enzyme-linked immunosorbent assay. Similarities and differences between MYSV and tenuiviruses (rice stripe virus group) are discussed. *Phytopathology*. Mar 1990. v. 80 (3). p. 303-309. ill. Includes references. (NAL Call No.: DNAL 464.8 P56).

0759

### Twospotted spider mites on field crops.

Edwards, C.R. Obermeyer, J.L.; Bledsoe, L.W. West Lafayette, Ind. : The Service. E - Purdue University, Cooperative Extension Service. In subseries: Field Crop Insects. July 1991. (39,rev.). 4 p. (NAL Call No.: DNAL SB844.I6P8).

0757

### Trichogramma spp. (Hymenoptera: Trichogrammatidae): field hosts and multiple parasitism in North Carolina.

JESCEP. Thomson, M.S. Stinner, R.E. Tifton, Ga. : Georgia Entomological Society. *Journal of entomological science*. Apr 1989. v. 24 (2). p. 232-240. Includes references. (NAL Call No.: DNAL QL461.G4).

0760

### Uptake, translocation, and metabolism of <sup>14</sup>C thuringiensin (beta-exotoxin) in corn.

JAFCAU. Mersie, W. Singh, M. Washington, D.C. : American Chemical Society. *Journal of agricultural and food chemistry*. Mar/Apr 1989. 37 (2). p. 481-483. Includes references. (NAL Call No.: DNAL 381 J8223).

0758

### Tubular helical structures and fine filaments associated with the leafhopper-borne maize yellow stripe virus.

PHYTA. Ammar, E.D. Gingery, R.E.; Gordon, D.T.; Aboul-Ata, A.E. St. Paul, Minn. : American Phytopathological Society. A new disease agent, designated maize yellow stripe virus (MYSV) and transmitted in a persistent manner by the leafhopper *Cicadulina chinai*, is associated with three types of symptoms on infected plants: fine stripe, coarse stripe, and chlorotic stunt. Light and electron microscopy of naturally or experimentally infected maize or sorghum leaves showing any of these three symptoms revealed the presence of large, amorphous, intracytoplasmic inclusions in phloem elements, vascular parenchyma, bundle sheath, and mesophyll cells. These inclusions contained masses of long, flexuous, tubular structures, approximately 34 nm in diameter, apparently composed of helically wound filaments 5-7 nm thick. These structures commonly were associated with or sandwiched between aggregated mitochondria, some of which were degenerated. Some of the cells containing tubular structures also contained masses of loosely or densely packed fine fibrils. Purified preparations obtained from naturally infected leaves had typical nucleoprotein ultraviolet absorbance spectra and contained fine filaments 4-8 nm in diameter. Crystallized, apparently nonvirion protein also was purified from these leaves and was

0761

### Weed management to minimize black cutworm (Lepidoptera: Noctuidae) damage in no-till corn.

JEENAI. Engelken, L.K. Showers, W.B.; Taylor, S.E. Lanham, Md. : Entomological Society of America. Field studies were conducted in 1984 and 1985 to evaluate the interaction between black cutworm, *Agrotis ipsilon* (Hufnagel), damage and weed competition on no-till corn (*Zea mays* L.) growth and yields. Corn seedling damage by *A. ipsilon* introduced as third instars 5 d before planting was most severe when weeds were removed at the coleoptile stage and larvae were predicted to be fifth to sixth instars. Delaying weed removal until plants had attained the two-leaf stage significantly decreased the percentage of corn plants damaged by *A. ipsilon* larvae. *A. ipsilon* larvae introduced as second instars or a combination of neonate, second, and third instars 5 d before planting damaged more corn plants when weed removal was performed at two-leaf stage corn and larvae were predicted to be fifth to sixth instars. A significant relationship between the number of corn seedlings cut and weed population occurred for these introduced smaller instars when weed removal occurred at two-leaf stage corn. Delaying weed removal until four-leaf stage corn resulted in significant grain yield reductions from both weed competition and *A. ipsilon* damage in 1984 and only from weed competition in 1985. *Journal of economic entomology*. June 1990. v. 83 (3). p. 1058-1063. Includes references. (NAL Call

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0762

**Western corn rootworm (Coleoptera: Chrysomelidae) larval survival and damage potential to corn subjected to nitrogen and plant density treatments.**

JEENAI. Spike, B.P. Tollefson, J.J. College Park, Md. : Entomological Society of America. A 2-yr field study was used to examine the main effects and interactions of western corn rootworm (WCR), *Diabrotica virgifera virgifera* LeConte, infestations, nitrogen (N), and corn plant population levels on larval survival and damage, and root growth response. Nitrogen application and higher plant density treatments increased adult emergence, although there were significant N by plant density interactions both years. In 1985, root damage ratings increased with moderate N application but decreased with high N levels. Plant density treatments had no effect on damage ratings. Nitrogen application in 1985 decreased lodging by 44% in plants injured by WCR. Increased N and low to moderate plant population levels resulted in larger root systems and greater regrowth and brace root development. A significant N by plant density interaction indicated that a high plant population level negated the positive response of brace root development to increased N application. WCR infestation promoted root regrowth and brace root development. Decreased adult emergence, root damage ratings, lodging, and increased root regeneration were observed in 1984, a year characterized by excessive June rainfall and saturated soil conditions. These results suggest that N, plant population, and soil moisture levels are contributing factors in WCR larval survival and recovery of the corn plant root system. *Journal of economic entomology*. Oct 1988. v. 81 (5). p. 1450-1455. Includes references. (NAL Call No.: DNAL 421 J822).

0763

**Western corn rootworm damage: effect of tillage on plant response and grain yield.**

CRPSAY. Riedell, W.E. Gustin, R.D.; Beck, D.L.; Hanson, D.G. Madison, Wis. : Crop Science Society of America. Corn rootworms (*Diabrotica* spp.) are the most economically destructive insect pests of corn (*Zea mays L.*) in the U.S. Midwest. The objective of this 2-yr field study was to measure plant response and yield under ridge tillage or spring disk tillage in fields artificially infested with western corn rootworm (*D. virgifera virgifera* LeConte). Corn rootworm infestations were applied at 0, 1650, 3300, or 6600 viable eggs m<sup>-2</sup>. We measured insect survival to adult, root damage ratings, nodal root volume (Nodes 4 and above) at maximum insect damage, and grain yield. In 1988, which was characterized by above-normal temperature and below-normal precipitation, root damage increased (6.7 rating at 1650 eggs m<sup>-2</sup> to 7.9 at 6600 eggs m<sup>-2</sup>) and insect survival to adult decreased (4.9% at 1650 eggs m<sup>-2</sup> to 1.2% at 6600 eggs m<sup>-2</sup>) with increasing

infestation level under both tillage systems. During the 1988 season, plants grown under ridge tillage had larger nodal root systems (17.9 mL) than under spring disk tillage (9.9 mL). Ridge-tilled plants also had greater yield (5.5 vs. 4.1 Mg ha<sup>-1</sup> with no rootworm eggs; 4.3 vs. 3.1 with 1650 eggs m<sup>-2</sup>; and 4.1 vs. 2.2 Mg ha<sup>-1</sup> with 3300 eggs m<sup>-2</sup>). In 1989, which had near normal temperature but below-normal precipitation during the growing season, root damage increased (from a 1.1 to 5.9 rating as the infestation level increased from 0 to 6600 eggs m<sup>-2</sup>) and insect survival to adult decreased (from 1.3 to 0.7% as the infestation level increased from 1650 to 6600 eggs m<sup>-2</sup>) under both tillage systems. Tillage practice had no effect on plant response to rootworm feeding or yield. However, the number of nodal root axes per plant (22.4) and grain yield (8.8 Mg ha<sup>-1</sup>) were increased significantly under both tillage systems infested with 6600 eggs m<sup>-2</sup> of row (29.0 axes per plant and 10.2 Mg ha<sup>-1</sup>). These results suggest that during a hot, dry growing season, ridge tillage increased yield for uninfested and rootworm-infested plants when compared with yield. *Crop science*. Sept/Oct 1991. v. 31 (5). p. 1293-1297. Includes references. (NAL Call No.: DNAL 64.8 C883).

0764

**Western corn rootworm damage in maize: greenhouse technique and plant response.**

CRPSAY. Riedell, W.E. Madison, Wis. : Crop Science Society of America. Corn rootworms are the most economically destructive insect pests of maize (*Zea mays L.*). There is little information in the literature concerning how these insects influence the physiology of their hosts. The objective of this study was to establish and validate a greenhouse technique for the investigation of the response of maize to damage caused by the western corn rootworm (*Diabrotica virgifera virgifera* LeConte). Plants grown in cellulose-fiber pots for 49 d in the greenhouse were infested with second-stage rootworm larvae. Infestation with rootworm larvae that were in relative developmental synchrony with the plant was accomplished by monitoring growing degree days (GDD). Three weeks after infestation, shoots were harvested, roots were washed free of soil, and shoots and roots were evaluated for rootworm damage. Plants infested with 150 rootworms per pot had shoot characteristics (plant height, ear shoot fresh wt., ear length and width, ear dry wt., and husk dry wt.) that were smaller than those of uninfested plants, while plants infested with 50 rootworms per pot had shoot characteristics that were larger than uninfested plants. The fourth and fifth nodes of roots were completely pruned in the 150-rootworm treatment, while these same nodes from root systems of plants with 50 rootworms per pot had only minor pruning with extensive rootworm tunneling. This tunneling damage was accompanied by extensive lateral root proliferation. Lateral roots from damaged plants were wider and of longer total length than those from uninfested plants. These rootworm damage characteristics to roots of

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infested plants reared in the greenhouse were very similar to those characteristics of roots damaged by rootworms under a field situation. Consequently, this greenhouse technique should be useful for rearing plants with rootworm damage for physiological studies. *Crop science*. Mar/Apr. 1989. v. 29 (2). p. 412-415. Includes references. (NAL Call No.: DNAL 64.8 C883).

0765

**Winter survival of *Heliothis zea* (Boddie) in cultivated and noncultivated soil in the southern Texas high plains.**

SENTD. Rummel, D.R. Neece, K.C. College Station, Tex. : Southwestern Entomological Society. *The Southwestern entomologist*. June 1989. v. 14 (2). p. 117-125. ill. Includes references. (NAL Call No.: DNAL QL461.S65).

0766

**Within-plant dispersal of banks grass mite (Acari: Tetranychidae) on corn.**

JKESA. Barron, J.A. Margolies, D.C. Lawrence, Kan. : The Society. *Journal of the Kansas Entomological Society*. Apr 1991. v. 64 (2). p. 209-215. Includes references. (NAL Call No.: DNAL 420 K13).

0767

**Yield-loss relationships and economic injury levels for European corn borer (Lepidoptera: Pyralidae) populations infesting Pennsylvania field corn.**

JEENAI. Bode, W.M. Calvin, D.D. Lanham, Md. : Entomological Society of America. Field studies were conducted during 1986 and 1987 to quantify the relationship between the number of European corn borer, *Ostrinia nubilalis* (Hubner), larvae per corn plant, plant growth stage, and corn grain yield for Pennsylvania. Corn plants were artificially infested with third-instar *O. nubilalis* during four plant stages (10-leaf, 16-leaf, blister, and dough) with 0, 2, 4, or 6 larvae per plant. Differences in grain weights between the uninfested check plots and highest infestation levels for 10-leaf, 16-leaf, blister, and dough stages of corn development in 1986 were 63.84, 69.07, 47.09, and 13.17 g per plant, respectively. In 1987, corn grain weights were reduced at six larvae per plant from the check by 50.57, 33.73, 22.9, and 2.79 g per plant for 10-leaf, 16-leaf, blister, and dough stages of corn development, respectively. Based on the linear regressions of the relationship between number of larvae per plant and corn grain weight for all four corn growth stages by year, average grain weight reductions across years when stalk feeding was initiated during the 10-leaf, 16-leaf, blister, and dough stages of plant development were 5.94, 5.01, 3.13, and 2.41% per larva per plant, respectively. Economic injury levels are presented for cases in which 100% control of *O. nubilalis* populations is assumed, and a method is shown for calculating economic injury level

values when less than 100% control is expected. *Journal of economic entomology*. Aug 1990. v. 83 (4). p. 1595-1603. Includes references. (NAL Call No.: DNAL 421 J822).

0768

**Yield reduction from feeding by *Euschistus servus* and *Euschistus variolarius* (Heteroptera: Pentatomidae) on stage V2 field corn.**

JEENAI. Apriyanto, D. Townsend, L.H.; Sedlacek, J.D. Lanham, Md. : Entomological Society of America. Field studies conducted to investigate the effect of feeding of the brown stink bug, *Euschistus servus* (Say), and the onespotted stink bug, *E. variolarius* (Palisot de Beauvois), on corn growth and yield showed that aside from plant mortality, the production of tillers was the most apparent injury. During the 2-yr study, 52.5% of the plants exposed to the brown stink bug and 38.8% of those exposed to the onespotted stink bug formed tillers. In general, mean extended leaf heights of tillered plants (distance from the soil surface to tip of tallest extended leaf) were significantly shorter than those of untillered plants exposed to stink bugs and controls. Stink bug feeding also resulted in delayed silking of tillered plants. Mean grain weight per ear from plants that formed tillers was reduced significantly compared with controls, but yields from untillered plants were not. Effects of the two stink bug species were similar. *Journal of economic entomology*. Apr 1989. v. 82 (2). p. 445-448. Includes references. (NAL Call No.: DNAL 421 J822).

0769

**Yield response of corn stands to stalk borer (Lepidoptera: Noctuidae) injury imposed during early development.**

JEENAI. Davis, P.M. Pedigo, L.P. Lanham, Md. : Entomological Society of America. In a 3-yr study, visual injury and grain yield were evaluated for two full-season corn (*Zea mays* L.) hybrids infested by stalk borer larvae, *Papaipema nebris* (Guenee), at leaf stages 1 through 7. Individual plants were assigned a rating based upon a six-class scale, and the average rating per plot was determined; 80% of the total number of injured plants within each plot were classified as injured within 1 wk after infestation. A significant linear relationship between leaf stage and injury rating was detected in all years of the study, with injury rating declining at an average rate of  $0.332 \pm 0.033$  points per leaf stage. In all years, infested plots yielded significantly less grain than uninfested control plots. Average yields of Pioneer hybrids 3541 and 3377 were reduced by 24.8 and 18.9%, respectively, when compared with uninfested control plots. In 2 of 3 yr, yield losses declined linearly as plants were attacked later in development. However, in a drought-stressed year, leaf stage was independent of plot yield even though injury ratings for each leaf stage were very similar to those recorded during years with normal rainfall. Linear models, which regressed

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injury rating on yield, were developed and compared for each year and hybrid combination. Journal of economic entomology. Aug 1990. v. 83 (4). p. 1582-1586. Includes references. (NAL Call No.: DNAL 421 J822).

0770

### **Yield response of corn subjected to western corn rootworm (Coleoptera: Chrysomelidae) infestation and lodging.**

JEENAI. Spike, B.P. Tollefson, J.J. Lanham, Md. : Entomological Society of America. Lodging of corn, *zea mays* L., is often attributed to injury by larvae of western corn rootworm, *Diabrotica virgifera* Leconte. Because leaves of lodged plants exhibit vertical and horizontal spatial aberrations, yield may be adversely affected because of reduced photosynthetic efficiency. In a 2-yr study, we used a factorial arrangement of rootworm infestation (0 and 1,200 eggs per 30.5-cm row) and lodging treatments (lodged and upright) to determine effects on plant biomass and grain yield. In a second study, we examined how plants lodged from rootworm injury differ from upright plants with respect to plant and ear height, root rating, total leaf area, and vertical leaf area distribution. In 1987, rootworm-infested and lodged plants had significantly reduced plant dry weight and grain yield at nearly all sampling dates. Lodging treatments reduced grain yield of infested plants by an additional 11.9% over yield of upright, infested plants. In 1988, no differences in dry weight or yield occurred with infested plants, but lodging treatments reduced grain yield by 34.3%. In a severely lodged canopy, plant and ear height and light interception were significantly reduced in comparison with those of upright plants. Linear regressions of incident light versus leaf areas above each 0.31-m increment in the corn canopy resulted in significant slope (light extinction) differences. Because dry weight and yield were more consistently reduced by lodging than by rootworm infestation treatments, lodging must be an important factor in the relation between rootworm infestation and yield loss. Journal of economic entomology. Dct 1991. v. 84 (5). p. 1585-1590. Includes references. (NAL Call No.: DNAL 421 J822).

0771

**1989 insect management guide: corn and sorghum.** NEUAA. Danielson, S.D. Baxendale, F.P.; Wright, R.J.; Witkowski, J.F.; Campbell, J.B.; Peters, L.L.; Hein, G.L.; Hagen, A.F.; Jarvi, K.J.; Seymour, R.C. Lincoln, Neb. : The Service. EC - Cooperative Extension Service, University of Nebraska. 1989. (1509). 19 p. illl. Includes references. (NAL Call No.: DNAL 275.29 N272EX).

0772

### **1990 insect management guide.**

NEUAA. Wright, R.J. Danielson, S.D.; Witkowski, J.F.; Hein, G.L.; Peters, L.L.; Campbell, J.B.; Baxendale, F.P.; Hagen, A.F.; Jarvi, K.J.; Seymour, R.C. Lincoln, Neb. : The Service. EC - Cooperative Extension Service, University of Nebraska. 1990. (90-1509). 23 p. (NAL Call No.: DNAL 275.29 N272EX).

0773

### **2-methoxyphenols, 1,2-dimethoxybenzenes, and 1,3-Benzodioxoles as attractants for the northern corn rootworm (Coleoptera; Chrysomelidae).**

JEENAI. McGovern, T.P. Ladd, T.L. Jr. College Park, Md. : Entomological Society of America. Abstract: Selected 2-methoxyphenols, 1,2-dimethoxybenzenes, and 1,3-benzodioxoles were tested in the field as attractants for the northern corn rootworm (NCR), *Diabrotica barberi* Smith & Lawrence, in comparison with eugenol (4-allyl-2-methoxyphenol), isoeugenol (2-methoxy-4-(1-propenyl)phenol), and 2-methoxy-4-propylphenol. Of these, 4-ethyl-2-methoxyphenol and 4-butyl-2-methoxyphenol showed relatively high degrees of attraction. Structural comparisons indicated that in a eugenol-type structure (i.e., a 1,2,4-trisubstituted benzene) a 4-alkyl substituent and a 1-hydroxyl group are necessary features for attraction of the NCR. The optimal 4-alkyl chain length is a three-carbon chain. Journal of economic entomology. June 1988. v. 81 (3). p. 826-829. Includes references. (NAL Call No.: DNAL 421 J822).

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0774

**Abundance and vertical distribution of *Longidorus brevianulatus* associated with corn and potato.**

JONEB. MacGuidwin, A.E. Lake Alfred, Fla. : Society of Nematologists. *Journal of nematology*. July 1989. v. 21 (3). p. 404-408. Includes references. (NAL Call No.: DNAL QL391.N4J62).

0775

**Age structure and community diversity of nematodes associated with maize in Iowa sandy soils.**

JONEB. Norton, D.C. Edwards, J. Raleigh, N.C. : Society of Nematologists. *Journal of nematology*. July 1988. v. 20 (3). p. 340-350. Includes references. (NAL Call No.: DNAL QL391.N4J62).

0776

**Changes in vertical distribution of *Pratylenchus scribneri* under potato and corn.**  
JONEB. MacGuidwin, A.E. Stanger, B.A. Lake Alfred, Fla. : Society of Nematologists. *Journal of nematology*. Jan 1991. v. 23 (1). p. 73-81. Includes references. (NAL Call No.: DNAL QL391.N4J62).

0777

**Comparison of populations of *Pratylenchus brachyurus* based on isozyme phenotypes.**

JONEB. Payan, L.A. Dickson, D.W. Lake Alfred, Fla. : Society of Nematologists. *Journal of nematology*. Oct 1990. v. 22 (4). p. 538-545. ill. Includes references. (NAL Call No.: DNAL QL391.N4J62).

0778

**Control of the soybean cyst nematode by crop rotation in combination with a nematicide.**

JONEB. Sasser, J.N. Uzzell, G. Jr. Lake Alfred, Fla. : Society of Nematologists. An experiment to evaluate the control of soybean cyst nematodes compared 1 year, 2-year, and 3-year nonhost rotations with continuous soybeans (*Glycine max*) in 0.2-ha plots. In a second 1-year rotation, the plots were planted to soybean or corn (*Zea mays*) after fumigation in the spring with a split application of 1,3-dichloropropene (748.2 liters/ha). The effects of the nematicide were apparent the first year. Soybean yield was 1,482 kg/ha compared to 233 kg/ha in the untreated plots. In the second year, the highest yielding plants (2,035 kg/ha) were those following 1 year of corn that had been treated the previous year: plants in untreated plots yielded 288 kg/ha. Average yield of soybean following 1 year of corn was 957 kg/ha compared to 288 kg/ha for continuous soybean. In the third year, the

effects of the nematicide were still evident. Soybean plants in plots treated the first year followed by corn, then soybean, yielded 1,044 kg/ha compared to 761 kg/ha for soybean following 1 year of corn and 991 kg/ha for soybean following 2 years of corn. Plots planted to soybean for 3 consecutive years yielded 337 kg/ha. Nematicidal effects were no longer evident during the fourth year. Yields were most improved by the greatest number of years in the nonhost crop: highest yields in descending order were from plants following 3 years of corn, 2 years of corn, and 1 year of corn. Plots planted to soybean for 4 consecutive years yielded 130 kg/ha. Highly significant negative correlations occurred each year between initial nematode population densities and seed yield. *Journal of nematology*. July 1991. v. 23 (3). p. 344-347. Includes references. (NAL Call No.: DNAL QL391.N4J62).

0779

**Crop losses in corn induced by *Rhizoctonia solani* AG-2-2 and nematodes.**

PHYTA. Sumner, D.R. Minton, N.A. St. Paul, Minn. : American Phytopathological Society. Field corn was grown for 3 yr in a Fuquay loamy sand soil infested with *Rhizoctonia solani* AG-2-2. Grain yields averaged 6,890 and 8,760 kg/ha, with high and low inoculum levels, respectively, compared with 9,890 kg/ha for noninfested plots. Yields were reduced 47, 42, and 8% in soil infested with the high inoculum level and 15, 19, and 1% with the low inoculum level from the first through the third years, respectively, compared with noninfested soil. The percentage of crown and brace roots with terminal decay 7-8 wk after planting had a highly significant effect on grain yield each year. The root disease index, the total number of crown and brace roots per plant, the number of roots without lesions, and nematodes explained 44-47% of the variation in yield each year. *Phytopathology*. Includes statistical data. Sept 1989. v. 79 (9). p. 934-941. Includes references. (NAL Call No.: DNAL 464.8 P56).

0780

**Determining consistency of spatial dispersion of nematodes in small plots.**

JONEB. McSorley, R. Dickson, D.W. Lake Alfred, Fla. : Society of Nematologists. *Journal of nematology*. Jan 1991. v. 23 (1). p. 65-72. Includes references. (NAL Call No.: DNAL QL391.N4J62).

0781

**Distribution of *Pratylenchus scribneri* between root and soil habitats.**

JONEB. MacGuidwin, A.E. Lake Alfred, Fla. : Society of Nematologists. *Journal of nematology*. July 1989. v. 21 (3). p. 409-415. Includes references. (NAL Call No.: DNAL

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QL391.N4J62).

0782

**Effect of tillage and vetch-corn versus vetch-grain sorghum succession multicropping systems on population dynamics of phytoparasitic nematodes.**

Corella, J.F. Gallaher, R.N.; Dickson, D.W. Gainesville, Fla. : The Stations. Agronomy research report AY - Agricultural Experiment Stations, University of Florida. 1988. (88-01). 8 p. Includes references. (NAL Call No.: DNAL S540.A2F62).

0783

**Effects and dynamics of a nematode community on maize.**

JONEB. McSorley, R. Dickson, D.W. Lake Alfred, Fla. : Society of Nematologists. Journal of nematology. Oct 1989. v. 21 (4). p. 462-471. Includes references. (NAL Call No.: DNAL QL391.N4J62).

0784

**Effects of crop rotation and nonfumigant nematicides on peanut and corn yields in fields infested with *Criconemella* species.**

JONEB. Ayers, A.R. Duncan, H.E.; Barker, K.R.; Beute, M.K. Raleigh, N.C. : Society of Nematologists. Journal of nematology. Apr 1989. v. 21 (2). p. 268-275. Includes references. (NAL Call No.: DNAL QL391.N4J62).

0785

**Evaluation of potential problems in a changing agricultural system: nematode control in Hawaiian crops.**

PLDIDE. Schenck, S. Holtzmann, O.V. St. Paul, Minn. : American Phytopathological Society. Plant disease. Nov 1990. v. 74 (11). p. 837-843. illl. Includes references. (NAL Call No.: DNAL 1.9 P69P).

0786

**Farm-level evaluation of planting flexibility proposals for the 1990 farm bill: effects on use of corn rootworm insecticides and nitrogen.**

Holtkamp, D. Ames, Iowa : The Center. Staff report - Iowa State University, Center for Agricultural and Rural Development. Sept 1990. (44). 74 p. Includes references. (NAL Call No.: DNAL HD1401.S75).

0787

**Firms foresee high stakes in emerging biopesticide market.**

Twombly, R. Philadelphia, Pa. : Institute for Scientific Information. The scientist. July 9, 1990. v. 4 (14). p. 1, 8-9, 28. (NAL Call No.: DNAL Q1.S37).

0788

**Host efficiencies of *Zea diploperennis* and *Z. perennis* for *Pratylenchus* spp.**

JONEB. Norton, D.C. Lake Alfred, Fla. : Society of Nematologists. Journal of nematology. Oct 1989. v. 21 (4). p. 547-548. Includes references. (NAL Call No.: DNAL QL391.N4J62).

0789

**Host status of five weed species and their effects on *Pratylenchus zeae* infestation of maize.**

JONEB. Jordaan, E.M. De Waele, D. Raleigh, N.C. : Society of Nematologists. Journal of nematology. Oct 1988. v. 20 (4). p. 620-624. Includes references. (NAL Call No.: DNAL QL391.N4J62).

0790

**Influence of selected plant species on hatching of eggs and development of juveniles of *Heterodera glycines*.**

JONEB. Schmitt, D.P. Riggs, R.D. Lake Alfred, Fla. : Society of Nematologists. Journal of nematology. Jan 1991. v. 23 (1). p. 1-6. Includes references. (NAL Call No.: DNAL QL391.N4J62).

0791

**Interaction of three plant-parasitic nematodes on corn and soybean.**

JONEB. Dickson, D.W. McSorley, R. Lake Alfred, Fla. : Society of Nematologists. Journal of nematology. Supplement to the Journal of Nematology (Annals of Applied Nematology). Oct 1990. v. 22 (4S). p. 783-791. Includes references. (NAL Call No.: DNAL QL391.N4J62).

0792

**Intron conservation across the prokaryote-eukaryote boundary: structure of the nuclear gene for chloroplast glyceraldehyde-3-phosphate dehydrogenase from maize.**

PNASA. Quigley, F. Martin, W.F.; Cerff, R. Washington, D.C. : The Academy. Proceedings of the National Academy of Sciences of the United States of America. Apr 1988. v. 85 (8). p. 2672-2676. Includes references. (NAL Call No.: DNAL 500 N21P).

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0793

**Nematode thresholds for soybeans, corn, cotton, and peanuts.**  
Keonning, S.R. Duncan, H.E.; Bailey, J.E.; Barker, K.R.; Imbriani, J.L. Raleigh, N.C. : The Service. AG - North Carolina Agricultural Extension Service, North Carolina State University. Dec 1990. (394, rev.). 6 p. (NAL Call No.: DNAL S544.3.N6N62).

0794

**On-farm research trials in Illinois: how effective were the reduced rates of soil insecticides for corn rootworm control?**.  
Gray, M. Steffey, K.; Oloumi-Sadeghi, H. Urbana, Ill. : Cooperative Extension Service, Univ of Illinois at Urbana-Champaign, 1991 . Illinois Agricultural Pesticides Conference summaries of presentations January 8, 9, 10, 1991, Urbana, Illinois / Univ of Illinois at Urbana-Champaign, Coop Ext Serv, in coop with the Illinois Natural History Survey. "Proceedings of the 1991 Illinois Agricultural Pesticides Conference," January 8-10, 1991, Urbana, Illinois. p. 32-46. Includes references. (NAL Call No.: DNAL SB950.2.I3I4).

0795

**Pathogenicity of *Quinisulcius curvus* to two varieties of maize.**  
Khan, A. Jaffry, A.H.; Aslam, M. Raleigh, N.C. : Crop Nematode Research & Control Project . International nematology network newsletter. Dec 1988. v. 5 (4). p. 18-19. Includes references. (NAL Call No.: DNAL SB998.N45I5).

0796

**Population dynamics and damage potential of *Belonolaimus* sp. on corn.**  
JONEB. Todd, T.C. Lake Alfred, Fla. : Society of Nematologists. Journal of nematology. Oct 1989. v. 21 (4, suppl.). p. 697-702. ill. Includes references. (NAL Call No.: DNAL QL391.N4J62).

0797

**Reaction of different populations of *Heterodera avenae* on winter maize.**  
Dalal, M.R. Dahiya, R.S.; Bhatti, D.S.; Nandal, S.N. Raleigh, N.C. : Crop Nematode Research & Control Project . International nematology network newsletter. Dec 1988. v. 5 (4). p. 5-6. Includes references. (NAL Call No.: DNAL SB998.N45I5).

0798

**Registration of SD101 parental line of maize.**  
CRPSAY. Wicks, Z.W. III. Smolik, J.D.; Carson, M.L.; Scholten, G.G. Madison, Wis. : Crop Science Society of America. Crop science. Jan/Feb 1990. v. 30 (1). p. 242. Includes references. (NAL Call No.: DNAL 64.8 C883).

0799

**Reproduction of *Meloidogyne javanica* on corn hybrids and inbreds.**  
Windham, G.L. Williams, W.P. Washington, D.C. : The Service. Reprints - U.S. Department of Agriculture, Agricultural Research Service. 1988. (3). p. 25-28. Includes references. (NAL Call No.: DNAL aS21.A8U5/ARS).

0800

**Reproduction of *Meloidogyne javanica* on corn hybrids and inbreds.**  
AANEEF. Windham, G.L. Williams, W.P. Lawrence, Kan. : Society of Nematologists. Annals of applied nematology. Oct 1988. v. 2. p. 25-28. Includes references. (NAL Call No.: DNAL SB998.N4A5).

0801

**Reproduction of *Pratylenchus penetrans* on potato and crops grown in rotation with potato.**  
JONEB. Florini, D.A. Loria, R. Lake Alfred, Fla. : Society of Nematologists. Journal of nematology. Jan 1990. v. 22 (1). p. 106-112. Includes references. (NAL Call No.: DNAL QL391.N4J62).

0802

**Reproduction on *Meloidogyne incognita* on open-pollinated maize varieties.**  
JONEB. Aung, T. Windham, G.L.; Williams, W.P. Lake Alfred, Fla. : Society of Nematologists. Journal of nematology. Supplement to the Journal of Nematology (Annals of Applied Nematology). Oct 1990. v. 22 (4S). p. 651-653. Includes references. (NAL Call No.: DNAL QL391.N4J62).

0803

**Resistance of corn to southern root-knot nematode.**  
CRPSAY. Williams, W.P. Windham, G.L. Madison, Wis. : Crop Science Society of America. Crop science. May/June 1988. v. 28 (3). p. 495-496. Includes references. (NAL Call No.: DNAL 64.8 C883).

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0804

**Resistance of maize hybrids to Meloidogyne javanica.**  
NMTPA. Poerba, Y.S. Windham, G.L.; Williams, W.P. Auburn, Ala. : Organization of Tropical American Nematologists. *Nemotropica*. Dec 1990. v. 20 (2). p. 169-172. Includes references. (NAL Call No.: DNAL SB998.N4N4).

0805

**Risk efficient action thresholds for nematode management.**  
UPRAEN. Osteen, C.D. Moffitt, L.J.; Johnson, A.W. Madison, Wis. : American Society of Agronomy. *Journal of production agriculture*. Oct/Dec 1988. v. 1 (4). p. 332-338. Includes references. (NAL Call No.: DNAL S539.5.J68).

0806

**Suitability of alfalfa, corn, oat, red clover, and snapbean as hosts for the potato rot nematode, *Ditylenchus destructor*.**  
PLDIDE. MacGuidwin, A.E. Slack, S.A. St. Paul, Minn. : American Phytopathological Society. *Plant disease*. Jan 1991. v. 75 (1). p. 37-39. Includes references. (NAL Call No.: DNAL 1.9 P69P).

0807

**Survival of *Heterodera zeae* in soil in the field and in the laboratory.**  
JONEB. Krusberg, L.R. Sardanelli, S. Lake Alfred, Fla. : Society of Nematologists. *Journal of nematology*. July 1989. v. 21 (3). p. 347-355. Includes references. (NAL Call No.: DNAL QL391.N4J62).

0808

**Temperature and the life cycle of *Heterodera zeae*.**  
JONEB. Hutzell, P.A. Krusberg, L.R. Lake Alfred, Fla. : Society of Nematologists. *Journal of nematology*. July 1990. v. 22 (3). p. 414-417. Includes references. (NAL Call No.: DNAL QL391.N4J62).

0809

**Tillage and multiple cropping systems and population dynamics of phytoparasitic nematodes.**  
AANEEF. Gallaher, R.N. Dickson, D.W.; Corella, J.F.; Hewlett, T.E. Lawrence, Kan. : Society of Nematologists. *Annals of applied nematology*. Oct 1988. v. 2. p. 90-94. Includes references. (NAL Call No.: DNAL SB998.N4A5).

0810

**Winter survival of *Pratylenchus scribneri*.**  
JONEB. MacGuidwin, A.E. Forge, T.A. Lake Alfred, Fla. : Society of Nematologists. Population densities of *Pratylenchus scribneri* in a Plainfield loamy sand soil were sampled from 1 October to 1 May for 4 years. From May to October of each year, the site was planted to Russet Burbank potato and Wis 4763 corn. Percentages of change in population densities of nematodes were computed on the basis of number of nematodes present on 1 October. The decline of *P. scribneri* between growing seasons was nonlinear, with most mortality occurring in the autumn before the soil froze. Winter survival, defined as the percentage of change in population densities from 1 October to 1 May the following year, ranged from 50 to 136% for nematodes in corn plots and from 15 to 86% for nematodes in potato plots. There was no difference in survival of nematodes of different life stages or among root and soil habitats. Winter survival of nematodes was density-dependent in 3 of 4 years in corn plots and in 1 of 4 years in potato plots. Although predators were present, their abundance was not correlated with the winter survival of nematodes. Cumulative and average snow cover was correlated with the survival of nematodes associated with corn but not with potato. No relationships between other climatic factors and survivorship were detected. *Journal of nematology*. Apr 1991. v. 23 (2). p. 198-204. Includes references. (NAL Call No.: DNAL QL391.N4J62).

# PLANT DISEASES - GENERAL

0811

**Corn diseases: new and potential problems.**

White, D. Urbana, Ill. : Cooperative Extension Service, Univ of Illinois at Urbana-Champaign, 1991. Illinois Agricultural Pesticides Conference summaries of presentations January 8, 9, 10, 1991, Urbana, Illinois / Univ of Illinois at Urbana-Champaign, Coop Ext Serv, in coop with the Illinois Natural History Survey. "Proceedings of the 1991 Illinois Agricultural Pesticides Conference," January 8-10, 1991, Urbana, Illinois. p. 70-71. (NAL Call No.: DNAL SB950.2.I3I4).

0812

**Disease control.**

AKFRAC. Milus, E.A. Dale, J.L. Fayetteville, Ark. : The Station. Arkansas farm research - Arkansas Agricultural Experiment Station. Jan/Feb 1989. v. 38 (1). p. 4. (NAL Call No.: DNAL 100 AR42F).

0813

**Maize diseases a reference source for seed technologists /Denis C. McGee.**

McGee, Denis C. St. Paul, Minn. : APS Press, c1988. 150 p. : ill. ; 28 cm. Includes bibliographies and index. (NAL Call No.: DNAL SB608.M2M26).

0814

**The most important corn insects.**

AGRYA. Dicke, F.F. Guthrie, W.D. Madison, Wis. : American Society of Agronomy. Agronomy. In the series analytic: Corn and Corn Improvement, Third Edition / edited by G.F. Sprague and J.W. Dudley. 1988. (18). p. 767-867. ill. Includes references. (NAL Call No.: DNAL 4 AM392).

0815

**Pest Control in Arkansas cereal crops through genetic resistance.**

AKFRAC. Bacon, R.K. Moldenhauer, K.A.K.; York, J.O. Fayetteville, Ark. : The Station. Arkansas farm research - Arkansas Agricultural Experiment Station. May/June 1990. v. 39 (3). p. 8. ill. (NAL Call No.: DNAL 100 AR42F).

# PLANT DISEASES - FUNGAL

0816

**Absence of trichothecenes in toxigenic isolates of Fusarium moniliforme.**  
APMBA. Mirocha, C.J. Abbas, H.K.; Vesonder, R.F. Washington, D.C. : American Society for Microbiology. Thirty-four isolates of *Fusarium moniliforme* were obtained from cereal grains collected in various parts of the world. The isolates were grown on rice and tested as a diet for toxicity to rats. Of these isolates, 53% caused death, 12% caused congestion and hemorrhage of the stomach and intestine as well as hematuria, 21% caused diarrhea, 38% caused weight loss, and 9% were nontoxic. The cultures were tested for T-2, HT-2, neosolaniol, acetyl-T-2, T-2-tetraol, iso-T-2, diacetoxyscirpenol, monoacetoxyscirpenol, deoxynivalenol, nivalenol, fusarenone-X, 3-acetyldeoxynivalenol, 15-acetyldeoxynivalenol, zearalenone, moniliformin, fusarochromanone, fusarin-C, and wortmannin; all were negative. In addition, *F. moniliforme* NRRL A25820 was grown on corn and banana fruit as solid substrates as well as on a defined liquid medium; none of the above toxins were found. When *F. moniliforme* NRRL A25820 was incorporated into a rat diet, no toxicity was noted. Twenty-eight additional isolates of *F. moniliforme*, isolated from feed associated with equine leukoencephalomalacia, were grown on cracked corn for 2-weeks. The cultures were negative when tested for deoxynivalenol, 15-acetyldeoxynivalenol, diacetoxyscirpenol, monoacetoxyscirpenol, nivalenol, and fusarenone X. Seventy-five percent of the isolates were toxic to ducklings, indicating the presence of a toxin other than trichothecenes. Our results support the conclusion that *F. moniliforme* does not produce trichothecenes. Applied and environmental microbiology. Feb 1990. v. 56 (2). p. 520-525. Includes references. (NAL Call No.: DNAL 448.3 AP5).

0817

**Aflatoxin accumulation in inoculated ears of field-grown maize.**  
PLDIDE. Payne, G.A. Hagler, W.M. Jr.; Adkins, C.R. St. Paul, Minn. : American Phytopathological Society. Plant disease. May 1988. v. 72 (5). p. 422-424. Includes references. (NAL Call No.: DNAL 1.9 P69P).

0818

**Aflatoxin contamination in selected corn germplasm classified for resistance to European corn borer (Lepidoptera: Noctuidae).**  
JESCEP. McMillian, W.W. Widstrom, N.W.; Barry, D.; Lillehoj, E.B. Tifton, Ga. : The Entomological Science Society. Journal of entomological science. July 1988. v. 23 (3). p. 240-244. Includes references. (NAL Call No.: DNAL QL461.G4).

0819

**Aflatoxin in corn hybrids field inoculated with *Aspergillus flavus*.**  
AGUOAT. Scott, G.E. Zummo, N.; Lillehoj, E.B.; Widstrom, N.W.; Kang, M.S.; West, D.R.; Payne, G.A.; Cleveland, T.E.; Calvert, O.H.; Fortnum, B.A. Madison, Wis. : American Society of Agronomy. Corn (*Zea mays* L.) genotypes with resistance to *Aspergillus flavus* Link ex Fr. are needed to reduce aflatoxin contamination of grain. The primary objective of this study was to determine if the pinbar inoculation technique was effective in separating hybrids for resistance and susceptibility to kernel infection by *A. flavus* and aflatoxin contamination of the grain at a number of locations, but other inoculation techniques were evaluated at individual locations. Two single crosses, Mo18W X Mp313E and SC54 X Tx601, previously classified as resistant to kernel infection by *A. flavus* and two susceptible cresses, Mp68:616 X SC212M and GT106 X T202, were used. We found that hybrids previously classified as resistant to kernel infection by *A. flavus* had fewer kernels infected and lower aflatoxin concentration in the corn grain at harvest. However, these differences were not significant at all locations. Over six locations, resistant hybrids contained 58% less aflatoxin in the grain and 41% fewer infected kernels than susceptible hybrids. In addition to the pinbar, the side-needle, and to a lesser extent the knife inoculation technique, differentiated hybrid response to ear inoculation with *A. flavus*. Agronomy journal. May/June 1991. v. 83 (3). p. 595-598. Includes references. (NAL Call No.: DNAL 4 AM34P).

0820

**Aflatoxin in maize.**  
Payne, G.A. Boca Raton, Fla. : CRC Press. Critical reviews in plant sciences. Literature review. 1992. v. 10 (5). p. 423-440. Includes references. (NAL Call No.: DNAL QK1.C83).

0821

**Aflatoxin production via cross-feeding of pathway intermediates during cofermentation of aflatoxin pathway-blocked *Aspergillus parasiticus* mutants.**

APMBA. Cleveland, T.E. Bhatnagar, D.; Brown, R.L. Washington, D.C. : American Society for Microbiology. Cofermentation of *Aspergillus parasiticus* strains (SRRC 163 and SRRC 2043) blocked at different steps in the aflatoxin B1 (AFB1) biosynthetic pathway in a synthetic liquid medium or on seeds (cottonseed, corn kernels, and peanuts) resulted in production of AFB1. Strain SRRC 2043 accumulated O-methylsterigmatocystin (OMST), a late precursor in AFB1 biosynthesis, whereas SRRC 163 accumulated averantin, an early precursor in the pathway. Strain SRRC 2043 secreted large amounts of OMST in culture relative to the amounts of several other pathway intermediates secreted into media (by other AFB1

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pathway-blocked strains). AFB1 production occurred even when colonies of SRRC 163 and SRRC 2043 strains (producing no detectable AFB1) were grown together on an agar medium while physically separated from each other by a filter membrane (0.22-micromole pore size). In addition, when mycelia of strain SRRC 163 were added to culture filtrates (containing no mycelia but containing secreted OMST) of strain SRRC 2043, AFB1 production occurred. The results suggested a chemical (rather than genetic) mechanism of complementation for AFB1 production between AFB1 pathway-blocked strains, since no mycelial contact was required between these strains for AFB1 production. The mechanism for chemical complementation involves secretion of OMST by SRRC 2043 and subsequent absorption and conversion of OMST to AFB1 mycelia of strain SRRC 163. Appl. and environmental microbiology. Oct 1989. v. 57 (10). p. 2907-2911. Inc. refer. s. (NAL Call No.: DNAL 448.3 J82).

0822

### Alflatoxin in Georgia: factors associated with its formation in corn.

IWRBB. McMillian, W.W. Widstrom, N.W.; Beaver, R.W.; Wilson, D.M. Ames, Iowa : The Station. Research bulletin - Iowa State University, Agricultural and Home Economics Experiment Station. June 1991. (599). p. 329-344. Includes references. (NAL Call No.: DNAL 100 I09).

0823

### Analysis of ferrichrome biosynthesis in the phytopathogenic fungus *Ustilago maydis*: cloning of an ornithine-N5-oxygenase gene.

JOBAAY. Wang, J. Budde, A.D.; Leong, S.A. Washington, D.C. : American Society for Microbiology. By using a non-enterobactin-producing enb-7 mutant of *Salmonella typhimurium* LT2 as a biological indicator, a novel screening method was developed for identifying mutants of *Ustilago maydis* defective in the biosynthesis of the siderophores ferrichrome and ferrichrome A. Two classes of siderophore mutations, both recessive, were isolated after mutagenesis of haploid cells of the corn smut fungus. Class I mutants no longer produced ferrichrome while retaining the ability to produce ferrichrome A; class II mutants were defective in the production of both ferrichrome and ferrichrome A. Genetic and biochemical data suggest that class II mutants are defective in the ability to hydroxylate L-ornithine to delta-N-hydroxyornithine, the first step in the biosynthesis of these siderophores. A genomic library of wild-type *U. maydis* DNA was constructed in the cosmid transformation vector pCU3, which contains a dominant selectable marker for hygromycin B resistance. Two cosmids, pSid1 and pSid2, were identified in this library by their ability to complement class II siderophore auxotrophs. The production of both siderophores were concomitantly restored in the majority of the resultant transformants. Transforming DNA could be

recovered from the fungal, cosmid-containing transformants by in vitro packaging with lambda bacteriophage extracts. Alternatively, the clones could be identified by a sib selection procedure. Cotransformation was found to occur at a high frequency in the fungus and was used to determine that a 2.5-kilobase HindIII-NruI fragment in pSid1 was responsible for complementing the class II siderophore biosynthetic mutation. Journal of bacteriology. May 1989. v. 171 (5). p. 2811-2818. iii. Includes references. (NAL Call No.: DNAL 448.3 J82).

0824

### Annual contamination of *Heliothis zea* (Lepidoptera: Noctuidae) moths with *Aspergillus flavus* and incidence of aflatoxin contamination in preharvest corn in the Georgia Coastal Plain.

JESCEP. McMillian, W.W. Widstrom, N.W.; Wilson, D.M.; Evans, B.D. Tifton, Ga. : Georgia Entomological Society. Journal of entomological science. Jan 1990. v. 25 (1). p. 123-124. (NAL Call No.: DNAL QL461.G4).

0825

### Anthracnose kernel rot of maize caused by *Colletotrichum graminicola* (Ces.) Wils.: mode of entrance into and disease progression in ears.

Nankam, C. Foley, D.C. Cedar Falls, Iowa : The Academy. The Journal of the Iowa Academy of Science : JIAS. Sept 1988. v. 95 (3). p. 79-81. Includes references. (NAL Call No.: DNAL Q11.J68).

0826

### Be on the lookout for gray leaf spot on corn.

Bergstrom, G.C. Batavia, N.Y. : Agricultural Div. of Coop Extension, Four Western Plain Counties, N.Y. State. Ag impact. Includes abstract. Aug 1989. v. 16 (8). p. 8. (NAL Call No.: DNAL S544.3.N7A45).

0827

### Cell-autonomous recognition of the rust pathogen determines Rp1-specified resistance in maize.

SCIEA. Bennetzen, J.L. Blevins, W.E.; Ellingboe, A.H. Washington, D.C. : American Association for the Advancement of Science. The Rp1 gene of maize determines resistance to the leaf rust pathogen *Puccinia sorghi*. X-ray treatment of heterozygous (*Rp1* Oy/*rp1* oy) maize embryos generated seedlings with yellow sectors lacking Rp1. Yellow sectorized seedling inoculated with rust spores gave rust pustule formation in yellow (*Rp1*-lacking) sectors and hypersensitive resistance in green tissue, thereby demonstrating that the *Rp1* gene product is cellautonomous in its action. In cases where

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the hypersensitive reaction was initiated in green (*Rp1*) tissue next to a yellow sector, the hypersensitive response appeared to be propagated poorly, if at all, through *Rp1*-lacking cells. *Science*. July 8, 1988. v. 241 (4862). p. 208-210. ill. Includes references. (NAL Call No.: DNAL 470 SCI2).

0828

**Cercospora beticola toxin inhibits vanadate-sensitive H<sup>+</sup> transport in corn root membrane vesicles.**

PLPHA. Blein, J.P. Bourdil, I.; Rossignol, M.; Scalla, R. Rockville, Md. : American Society of Plant Physiologists. *Plant physiology*. Oct 1988. v. 88 (2). p. 429-434. Includes references. (NAL Call No.: DNAL 450 P692).

0829

**Changes in the distribution of trichothecenes and zearalenone in maize with gibberella ear rot during storage at cool temperatures.**

PLDIDE. Wicklow, D.T. Bennett, G.A.; Caldwell, R.W.; Smalley, E.B. St. Paul, Minn. : American Phytopathological Society. *Plant disease*. Apr 1990. v. 74 (4). p. 304-305. Includes references. (NAL Call No.: DNAL 1.9 P69P).

0830

**Characterization of *Puccinia polysora* epidemics in Pennsylvania and Maryland.**

PHYTAJ. Raid, R.N. Pennypacker, S.P.; Stevenson, R.E. St. Paul, Minn. : American Phytopathological Society. *Phytopathology*. May 1988. v. 78 (5). p. 579-585. Includes references. (NAL Call No.: DNAL 464.8 P56).

0831

**Cob and kernel infection by *Aspergillus flavus* and *Fusarium moniliforme* in inoculated, field-grown maize ears.**

PLDIDE. Zummo, N. Scott, G.E. St. Paul, Minn. : American Phytopathological Society. *Plant disease*. Sept 1990. v. 74 (9). p. 627-630. ill. Includes references. (NAL Call No.: DNAL 1.9 P69P).

0832

**Comparison of methods for inoculation of ears and stalks of maize with *Fusarium moniliforme*.**

PLDIDE. Drepper, W.J. Renfro, B.L. St. Paul, Minn. : American Phytopathological Society. *Plant disease*. Dec 1990. v. 74 (12). p. 952-956. Includes references. (NAL Call No.: DNAL 1.9 P69P).

0833

**Conidial dimorphism in *Colletotrichum graminicola*.**

MYCOAE. Panaccione, D.G. Vaillancourt, L.J.; Hanau, R.M. Bronx, N.Y. : The New York Botanical Garden. *Mycologia*. Nov/Dec 1989. v. 81 (6). p. 876-883. ill. Includes references. (NAL Call No.: DNAL 450 M99).

0834

**Corn and corn improvement /G.F. Sprague and J.W. Dudley, editors.**

Sprague, Gretchen.; Dudley, J. W. 1931-. Madison, Wis. : American Society of Agronomy, c1988. xix, 986 p. : ill. (some col.) ; 24 cm. Includes bibliographies and index. (NAL Call No.: DNAL 4 Am392 no. 18 1988).

0835

**Corn marketing, processing, and utilization.**

AGRYA. Watson, S.A. Madison, Wis. : American Society of Agronomy. *Agronomy*. In the series analytic: *Corn and Corn Improvement*, Third Edition / edited by G.F. Sprague and J.W. Dudley. 1988. (18). p. 881-940. Includes references. (NAL Call No.: DNAL 4 AM392).

0836

**Crop losses in corn induced by *Rhizoctonia solani* AG-2-2 and nematodes.**

PHYTA. Sumner, D.R. Minton, N.A. St. Paul, Minn. : American Phytopathological Society. Field corn was grown for 3 yr in a Fuquay loamy sand soil infested with *Rhizoctonia solani* AG-2-2. Grain yields averaged 6,890 and 8,760 kg/ha, with high and low inoculum levels, respectively, compared with 9,890 kg/ha for noninfested plots. Yields were reduced 47, 42, and 8% in soil infested with the high inoculum level and 15, 19, and 1% with the low inoculum level from the first through the third years, respectively, compared with noninfested soil. The percentage of crown and brace roots with terminal decay 7-8 wk after planting had a highly significant effect on grain yield each year. The root disease index, the total number of crown and brace roots per plant, the number of roots without lesions, and nematodes explained 44-47% of the variation in yield each year. *Phytopathology*. Includes statistical data. Sept 1989. v. 79 (9). p. 934-941. Includes references. (NAL Call No.: DNAL 464.8 P56).

0837

**Cross-pathogenicity of *Fusarium moniliforme* isolates from corn and asparagus.**

PLDIDE. Damiconi, J.P. Vineis, P.D.; Manning, W.J. St. Paul, Minn. : American Phytopathological Society. *Plant disease*. Sept 1988. v. 72 (9). p. 774-777. ill. Includes

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references. (NAL Call No.: DNAL 1.9 P69P).

0838

**Cytoplasmic male sterility and maternal inheritance of disease susceptibility in maize.**  
APPY.A. Pring, D.R. Lonsdale, D.M. Palo Alto, Calif. : Annual Reviews, Inc. Annual review of phytopathology. Literature review. 1989. v. 27. p. 483-502. Includes references. (NAL Call No.: DNAL 464.8 AN72).

0839

**Density and spatial pattern of propagules of macrophomina phaseolina in corn rhizospheres.**  
PHYTA. Olanya, O.M. Campbell, C.L. St. Paul, Minn. : American Phytopathological Society. Propagule density of *Macrophomina phaseolina* in soil was monitored from May to September 1985 at a total of eight sites chosen to represent a range of propagule densities in two fields. Corn seedlings were removed from one of two adjacent plots of 25 contiguous quadrats at each site to give reduced root density. Propagule density did not vary significantly within a plot or between adjacent plots through the season. From a regression of Lloyd's index of mean crowding ( $x$ ) on mean propagule density, individual propagules, i.e., colony-forming units of microsclerotia, were the basic unit of contagion in eight of 10 cases and these colony-forming units had a random spatial pattern. Monthly values of Morisita's index of aggregation ranged from 1.06 to 1.15 in Field A (Edgecombe County) and from 1.12 to 2.17 in Field B (Wayne County), confirming a random or slightly aggregated pattern of propagules. For frequency count data of propagule density, the Poisson distribution was appropriate in 18 of 40 and 20 of 40 cases for location A and B, respectively; however, the negative binomial distribution did not describe any data set. Because density and spatial pattern of propagules of *M. phaseolina* were generally similar throughout the growing season, this suggests either a lack of detectable reproductive activity and decay of propagules in soil during periods of active corn root growth or equal rates of propagule reproduction and death. *Phytopathology*. Oct 1989. v. 79 (10). p. 1119-1122. Includes references. (NAL Call No.: DNAL 464.8 P56).

0840

**Detection and identification of *Peronosclerospora sacchari* in maize by DNA hybridization.**

PHYTA. Yao, C.L. Magill, C.W.; Frederiksen, R.A.; Bonde, M.R.; Wang, Y.; Wu, P.S. St. Paul, Minn. : American Phytopathological Society. The causal organism of an incidence of maize downy mildew in Southern China proved difficult to classify by standard techniques. The pathogen, subsequently identified as *Peronosclerospora sacchari*, was detected by DNA hybridization in endosperm, pericarp, and pedicel tissues, but

not in embryos of infected maize seeds. Plasmid pCLY83, which had been selected from a *P. maydis* DNA library, served as the probe. No evidence for hybridization was detected between the probe and DNAs extracted from ten common seedborne fungi of maize: *Colletotrichum graminicola*, *Acremonium strictum*, *Curvularia lunata*, *Fusarium moniliforme*, *Bipolaris maydis*, *Macrophomina phaseolina*, *Rhizoctonia* sp., *Rhizopus* sp., *Penicillium* sp., and *Alternaria* sp. Hybridization was also not detected with DNAs isolated from plant tissues infected with *Sclerospora graminicola* or *Sclerophthora macroura*. The hybridizing DNA of the corn pathogen from China was readily distinguished from *P. sorghi* and *P. maydis* by differences in EcoRI, PvU1, BamHI and HindIII restriction patterns. RFLP patterns on blots of DNA from the plants showing symptoms of downy mildew in this case were the same as those for *P. philippinensis* and *P. sacchari*, now believed to be conspecific. *Phytopathology*. Aug 1991. v. 81 (8). p. 901-905. Includes references. (NAL Call No.: DNAL 464.8 P56).

0841

**Developmental predisposition of maize to anthracnose stalk rot.**

PLDIDE. Keller, N.P. Bergstrom, G.C. St. Paul, Minn. : American Phytopathological Society. Plant disease. Nov 1988. v. 72 (11). p. 977-980. Includes references. (NAL Call No.: DNAL 1.9 P69P).

0842

**Diallel analysis of maize inbreds for resistance to gray leaf spot.**

CRPSAY. Ulrich, J.F. Hawk, J.A.; Carroll, R.B. Madison, Wis. : Crop Science Society of America. Gray leaf spot (GLS) (caused by *Cercospora zeae-maydis* Tehon & Daniels) is becoming an increasingly prevalent disease of maize (*Zea mays* L.) in the USA. This study was conducted to determine the inheritance of GLS resistance. Nine inbreds and their 36 singlecross hybrids were evaluated for resistance in field studies conducted in 1987 and 1988. Plants were rated for disease development on a plot basis using a scale of 0.5 (resistant) to 5.0 (susceptible). Unweighted entry means for each year were analyzed using Gardner and Eberhart's diallel Analysis III for fixed effects. Highly significant ( $P < 0.01$ ) genotypic and general combining ability (GCA) differences were seen for resistance; the specific combining ability (SCA) mean square was not significant. Inbreds T222 and Mo18W had significant negative ( $P < 0.01$ ) GCA effects of -0.81 and -0.76, respectively, and were significantly more resistant in crosses than the other inbreds. The mean rating of crosses involving CI64 (GCA = -0.28,  $P < 0.05$ ) was lower than the mean of crosses involving the three susceptible inbreds Mo17Ht, DE811, and B73Ht (which had positive GCA effects of 0.26,  $P < 0.05$ , 0.47, and 1.08  $P < 0.01$ , respectively). As an inbred and in crosses, B73Ht was more susceptible than any

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other inbred evaluated, rating 3.1 in crosses compared with 1.6 for both T222 and Mo18W. The high level of resistance in inbreds T222 and Mo18W may be bred into elite, but GLS-susceptible, lines using backcross or recurrent selection procedures that utilize additive effects. Crop science. Nov/Dec 1990. v. 30 (6). p. 1198-1200. Includes references. (NAL Call No.: DNAL 64.8 C883).

0843

**Diallel analysis of resistance to anthracnose stalk rot in maize inbreds.**  
CRPSAY. Callaway, M.B. Smith, M.E.; Coffman, W.R. Madison, Wis. : Crop Science Society of America. Anthracnose stalk rot (ASR), caused by *Colletotrichum graminicola* (Ces.) Wils., has become an important disease of maize (*Zea mays* L.) in recent years. The purposes of this study were to evaluate general and specific combining ability effects for ASR resistance in a group of maize inbreds adapted to the northeastern USA, and to evaluate two commonly used ASR rating methods. Eight maize inbreds were crossed in a fixed effects diallel mating design and parents and crosses were grown at locations in New York, Delaware, and Pennsylvania. The two methods of rating for ASR resistance were: (i) total number of internodes infected, and (ii) number of internodes greater than 75% infected. The inbreds LB31B, RD5264, and RD6501 had highly significant negative general combining ability effects for ASR ratings, indicating that these lines would be good choices as parents where ASR resistance is desired. The inbreds RD5215, RD5217, RD5529, B59Ht, and B37 had significant, positive general combining ability effects. Specific combining ability was important for certain combinations of lines. Results for the two rating methods were practically identical. Only one of the two rating methods need be used in a given year. The evaluation methods should be alternated at yearly intervals to minimize the possibility of preferential selection for a particular mechanism of resistance. Crop science. Mar/Apr 1990. v. 30 (2). p. 335-337. Includes references. (NAL Call No.: DNAL 64.8 C883).

0844

**Different alleles of *Ustilago maydis* are necessary for maintenance of filamentous growth but not for meiosis.**  
PNASA. Banuett, F. Herskowitz, I. Washington, D.C. : The Academy. Proceedings of the National Academy of Sciences of the United States of America. Aug 1989. v. 86 (15). p. 5878-5882. 111. Includes references. (NAL Call No.: DNAL 500 N21P).

0845

**Distribution and measurement of aflatoxin in 1983 Iowa corn.**  
CECHAF. Schmitt, S.G. Hurlburgh, C.R. Jr. St. Paul, Minn. : American Association of Cereal Chemists. Cereal chemistry. May/June 1989. v. 66 (3). p. 165-168. maps. Includes references. (NAL Call No.: DNAL 59.8 C33).

0846

**Distribution of trichothecenes and zearalenone in *Fusarium graminearum*: rotted corn ears grown in a controlled environment.**  
JAFCAU. Bennett, G.A. Wicklow, D.T.; Caldwell, R.W.; Smalley, E.B. Washington, D.C. : American Chemical Society. Journal of agricultural and food chemistry. May/June 1988. v. 36 (3). p. 639-642. Includes references. (NAL Call No.: DNAL 381 J8223).

0847

**Distributions among S1 lines for European corn borer (Lepidoptera: Pyralidae) and stalk rot resistance ratings in two maize synthetics improved by recurrent selection.**  
JEENAI. Nyhus, K.A. Russell, W.A.; Guthrie, W.D. Lanham, Md. : Entomological Society of America. Four cycles of recurrent selection were used to reduce leaf-feeding damage caused by first-generation European corn borer (ECB), *Ostrinia nubilalis* Hubner, and pith decay associated with *Diplodia*, *Diplodia maydis* (Berkeley) Saccardo, stalk rot (DSR) in two maize, *Zea mays* L., synthetics, BSAA and BSBB. Recurrent selection was based on the evaluation of S(1) progenies. For this study, 100 unselected S(1) lines from each of the original (C0) and improved (C4) populations of BSAA and BSBB were evaluated for ECB resistance, DSR resistance, and stalk rind puncture. The distributions of S(1) lines for the three traits and the genetic relationships among traits were evaluated to determine the effectiveness of the recurrent selection programs. The C4s of both synthetics were more resistant than the C0s to ECB leaf feeding after artificial infestations, were more resistant to DSR after artificial inoculations, and possessed harder stalks. The differences between the C0 and C4 means were highly significant (P less than 0.01) in all instances. Reductions in genetic variation were observed in BSAA for ECB ratings and in BSBB for all three traits. The reductions in genetic variation were especially dramatic for ECB ratings, indicating that relatively few gene pairs were segregating for leaf-feeding resistance in BSAA and BSBB. Low and generally nonsignificant correlations between DSR ratings and rind puncture readings indicated that selection for both traits would be justified to improve field stalk lodging resistance. Journal of economic entomology. Feb 1989. v. 82 (1). p. 239-245. Includes references. (NAL Call No.: DNAL 421 J822).

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0848

**Effect of acriflavine on the composition of lipids in *Ustilago zea* (Beckm.) Ung., the causative agent of corn smut.**  
APBMAC. Nesterova, E.D. Kornilova, V.F.; Zav'yalova, L.A.; Kuznetsov, L.V. New York, N.Y. : Consultants Bureau. Applied biochemistry and microbiology. Translated from: Prikladnaia biokhimia i mikrobiologija, v. 24 (2), 1988, p. 196-202. (385 P93). Sept 1988. v. 24 (2). p. 162-168. Includes references. (NAL Call No.: DNAL QH345.A1P73).

0849

**Effect of C6 to C9 alkenals on aflatoxin production in corn, cottonseed, and peanuts.**  
APMBA. Zeringue, H.J. Jr. Washington, D.C. : American Society for Microbiology. The effect on aflatoxin production in *Aspergillus flavus*-inoculated corn, cottonseed, and peanuts in static culture in the presence of gaseous phase C6 to C9 alkenals was investigated. Aflatoxin B<sub>1</sub> production was stimulated in corn at the lowest alkenal concentration (1-microliter level) tested. Aflatoxin B<sub>1</sub> was completely eliminated at the highest alkenal concentrations (20-microliter level) tested in both treated corn and cottonseed cultures. Applied and environmental microbiology. Aug 1991. v. 57 (8). p. 2433-2434. Includes references. (NAL Call No.: DNAL 448.3 AP5).

0850

**Effect of high temperature stress peroxidase activity and electrolyte leakage in maize in relation to sporulation of *Bipolaris maydis* race T.**  
PHYTA. Garraway, M.O. Akhtar, M.; Wokoma, E.C.W. St. Paul, Minn. : American Phytopathological Society. Exposure of maize (*Zea mays* L.) leaves to high temperature stress, i.e., 42°C for 6 hr before inoculation with *Bipolaris maydis* race T followed by incubation in the dark at 28°C for 24 hr, resulted in a significant decrease in peroxidase activity in both resistant and susceptible isolines compared with the control (leaves not exposed to high temperature stress before inoculation). Also at 48 hr of incubation, high temperature stress before inoculation decreased peroxidase activity compared with the control in the resistant but not in the susceptible isolate. Moreover, the level of peroxidase activity in high temperature stress-treated and control leaves was significantly lower in the susceptible than in the resistant isolate 48 hr after inoculation. Exposure to high temperature stress resulted in a significant increase in electrolyte leakage as well as in sporulation in both isolines. Maize leaf extracts containing peroxidase activity as well as leachates from leaves of both isolines exposed to high temperature stress caused an increase in sporulation in vitro. Whereas increased sporulation on maize leaves in response to high temperature stress appeared to be related to

increased electrolyte leakage, such a relationship was not found with high temperature stress-induced changes in maize peroxidase. Phytopathology. July 1989. v. 79 (7). p. 800-805. Includes references. (NAL Call No.: DNAL 464.8 P56).

0851

**Effect of sodium bisulfite on peroxidase activity and electrolyte leakage in maize in relation to sporulation of *Bipolaris maydis* race T.**

OJSCA. Akhtar, M. Garraway, M.O. Columbus, Ohio : Ohio Academy of Science. Ohio journal of science. June 1990. v. 90 (3). p. 71-76. Includes references. (NAL Call No.: DNAL 440 OH3).

0852

**Effect of temperature on the preharvest infection of maize kernels by *Aspergillus flavus*.**

PHYTAJ. Payne, G.A. Thompson, D.L.; Lillehoj, E.B.; Zuber, M.S.; Adkins, C.R. St. Paul, Minn. : American Phytopathological Society. The effect of temperature on colonization of maize skills and the subsequent invasion of kernels by *Aspergillus flavus* was studied in controlled environments. At the postinoculation temperature regimes of 34/30°C (34°C X 9 hr, 30°C X 15 hr) and 26/22°C, as many as 28 and 2.4% of the kernels, respectively, were infected. Infected kernels were present in all areas of the ear, and neither temperature nor time of inoculation affected the location of infected kernels on the ear. At 34/30°C the fungus entered the ear tip in one day and was present in the base by 4 days. Internal infection of the ear did not occur until 8 days after inoculation, and the percentage of infected kernels increased greatly between 28-32 days, when kernel moisture was less than 32%. These results demonstrate that the parasitic ability of *A. flavus* is enhanced at high temperature and that, although surface colonization of the kernels occurs early, extensive internal infection does not occur until kernel maturity. Phytopathology. Oct 1988. v. 78 (10). p. 1376-1380. Includes references. (NAL Call No.: DNAL 464.8 P56).

0853

**Effects of different cereal and oilseed substrates on the growth and production of toxins by *Aspergillus alutaceus* and *Penicillium verrucosum*.**

JAFCAU. Madhyastha, S.M. Marquardt, R.R.; Frohlich, A.A.; Platford, G.; Abramson, D. Washington, D.C. : American Chemical Society. Journal of agricultural and food chemistry. July 1990. v. 38 (7). p. 1506-1510. Includes references. (NAL Call No.: DNAL 381 J8223).

(PLANT DISEASES - FUNGAL)

0854

**Effects of *Helminthosporium maydis* race T toxin on electron transport in susceptible corn mitochondria and prevention of toxin actions by dicyclohexylcarbodiimide.**

PLPNA. Holden, M.J. Sze, H. Rockville, Md. : American Society of Plant Physiologists. The effect of *Helminthosporium maydis* race T toxin on electron transport in susceptible cytoplasmic male-sterile Texas corn (*Zea mays* L.) mitochondria was investigated, using dichlorophenol indophenol and ferricyanide as electron acceptors. Succinate-dependent electron transport was stimulated by the toxin, consistent with the well described increase in membrane permeability induced by the toxin. Malate-dependent electron transport was inhibited. This inhibition of electron transport increased as a function of time of exposure to the toxin. Mitochondria from normal-fertile (N) corn were not affected by the toxin. Both the inhibition of electron transport and the increase in ion permeability, such as dissipation of membrane potential and  $\text{Ca}^{2+}$ , gradients, induced by the toxin in T corn was prevented by N,N'-dicyclohexylcarbodiimide, a hydrophobic carbodiimide. A water-soluble carbodiimide, 1-ethyl-3-(3-dimethylaminopropyl)-carbodiimide, was ineffective in preventing dissipation of membrane potential by the toxin. These results suggest that the various toxin actions are mediated via interaction of the toxin with one target site, most probably a 13 kilodalton polypeptide unique to T mitochondria. N,N'-dicyclohexylcarbodiimide may confer protection by modifying an amino acid residue in a hydrophobic portion of the target site. Plant physiology. Dec 1989. v. 91 (4). p. 1296-1302. Includes references. (NAL Call No.: DNAL 450 P692).

0855

**Effects of northern leaf blight and detasseling on yields and yield components of corn inbreds.**

PLDIDE. Bowen, K.L. Pedersen, W.L. St. Paul, Minn. : American Phytopathological Society. Plant disease. Nov 1988. v. 72 (11). p. 952-956. Includes references. (NAL Call No.: DNAL 1.9 P69P).

0856

**Effects of propiconazole on *Exserohilum turcicum* in laboratory and field studies.**

PLDIDE. Bowen, K.L. Pedersen, W.L. St. Paul, Minn. : American Phytopathological Society. Plant disease. Oct 1988. v. 72 (10). p. 847-850. Includes references. (NAL Call No.: DNAL 1.9 P69P).

0857

**Effects of temperature and light on virulence of *Exserohilum turcicum* on corn.**

PHYTA. Thakur, R.P. Leonard, K.J.; Leath, S. St. Paul, Minn. : American Phytopathological Society. Isolates of races 1, 2, and 4 of *Exserohilum turcicum* were tested for virulence at day/night temperatures of 22/18 or 26/22 C on seedlings of corn inbreds H4460 and B37 and their backcross lines with the Ht1 gene for resistance. Race 2 was virulent on B37 Ht1 at both 22/18 and 26/22 C but avirulent on H4460Ht1 at 26/22 C. Race 2 induced normal susceptible-type lesions on inbreds B37 and H4460 at both 22/18 and 26/22 C, and the number of lesions per plant was greater at reduced light intensities. Seedlings of H4460Ht1 grown at 22/18 C before inoculation became resistant to race 2 if they were transferred to 26/22 C within the first 3 days after inoculation. Conversely, if they were grown at 26/22 C and transferred to 22/18 C within 3 days after inoculation with race 2, they developed normal susceptible-type lesions; if they were transferred later, they developed intermediate- and susceptible-type lesions. If H4460 seedlings were grown at 22/18 C before inoculations, the lengths of lesions induced by races 2 and 4 were significantly correlated with the number of days they remained at 22/18 C before transfer to 26/22 C, but if they were grown at 26/22 C and transferred to 22/18 C, the lesion length were not significantly affected by the number of days at 26/22 C after inoculation. Phytopathology. June 1989 v. 79 (6). p. 631-635. Includes references. (NAL Call No.: DNAL 464.8 P56).

0858

**Epidemiology of *Aspergillus flavus* in corn.**

IWRBB. Wicklow, D.T. Ames, Iowa : The Station. Research bulletin - Iowa State University, Agricultural and Home Economics Experiment Station. Literature review. June 1991. (599). p. 315-328. Includes references. (NAL Call No.: DNAL 100 I09).

0859

**Evaluation of maize populations of broad genetic base for aflatoxin contamination in the field.**

Kang, M.S. Lillehoj, E.B.; Widstrom, N.W.; Cleveland, T.E. Baton Rouge, La. : The Department. Report of projects - Louisiana Agricultural Experiment Station, Department of Agronomy. 1988. p. 92-95. Includes references. (NAL Call No.: DNAL 100 L936).

## (PLANT DISEASES - FUNGAL)

0860

**Fungal toxins bind to the URF-13 protein in maize mitochondria and Escherichia coli.**  
Braun, C.J. Siedow, J.N.; Levings, C.S. III. Rockville, Md. : American Society of Plant Physiologists. Expression of the maize mitochondrial T-urf13 gene results in a sensitivity to a family of fungal pathotoxins and to methomyl, a structurally unrelated systemic insecticide. Similar effects of pathotoxins and methomyl are observed when T-urf13 is cloned and expressed in *Escherichia coli*. An interaction between these compounds and the membrane-bound URF13 protein permeabilizes the inner mitochondrial and bacterial plasma membranes. To understand the toxin-URF13 effects, we have investigated whether toxin specifically binds to the URF13 protein. Our studies indicate that toxin binds to the URF13 protein in maize mitochondria and in *E. coli* expressing URF13. Binding analysis in *E. coli* reveals cooperative toxin binding. A low level of specific toxin binding is also demonstrated in cms-T and cms-T-restored mitochondria; however, binding does not appear to be cooperative in maize mitochondria. Competition and displacement studies in *E. coli* demonstrate that toxin binding is reversible and that the toxins and methomyl compete for the same, or for overlapping, binding sites. Two toxin-insensitive URF13 mutants display a diminished capability to bind toxin in *E. coli*, which identifies residues of URF13 important in toxin binding. A third toxin-insensitive URF13 mutant shows considerable toxin binding in *E. coli*, demonstrating that toxin binding can occur without causing membrane permeabilization. Our results indicate that toxin-mediated membrane permeabilization only occurs when toxin or methomyl is bound to URF13. The Plant cell. Feb 1990. v. 2 (2). p. 153-161. Includes references. (NAL Call No.: DNAL QK725.P532).

0861

**Fusarium ear rot of corn.**  
CAGRA. Davis, R.M. Kegel, F.R.; Sills, W.M.; Farrar, J.U. Oakland, Calif. : Division of Agriculture and Natural Resources, University of California. California agriculture. Nov/Dec 1989. v. 43 (6). p. 4-5. (NAL Call No.: DNAL 100 C12CAG).

0862

**Fusarium spp. from corn, sorghum, and soybean fields in the central and eastern United States.**  
PHYTA. Leslie, J.F. Pearson, C.A.S.; Nelson, P.E.; Toussoun, T.A. St. Paul, Minn. : American Phytopathological Society. Samples of plant tissue and soil were collected from 41 corn, 18 sorghum, and 34 soybean fields in the central and southeastern United States in August 1986. Isolates of *Fusarium* were recovered from plant tissue, soil debris, and soil on a selective medium and identified to species. *Fusarium* spp. were recovered from all soils sampled. In corn,

tissue usually was colonized with *F. moniliforme*, *F. proliferatum*, or *F. subglutinans*. *F. semitectum*, *F. equiseti*, *F. oxysporum*, *F. graminearum*, *F. acuminatum*, and *F. chlamydosporum* were recovered from debris but not from soil, and *F. merismoides*, *F. proliferatum*, and *F. semitectum* were recovered from soil but not from debris. In sorghum, *F. moniliforme* or *F. proliferatum* were present in 71% of the tissue samples and 18% of the debris samples. *F. moniliforme* was present in debris from 39% of the sorghum fields but was absent from the corresponding soil samples. *F. acuminatum*, *F. chlamydosporum*, and *F. graminearum* were found in debris but not in soil, and *F. merismoides* was found only in soil samples from sorghum fields. *F. solani* was present in either soil debris or soil from all sorghum fields, whereas *F. oxysporum* was found in debris at 44% of the sites and in soil at 72% of the sites. *F. equiseti* was found in both debris and soil at 33% of the sites. *Fusarium* spp. recovered from soybean tissue generally were different from those recovered from corn and sorghum tissue. *F. oxysporum* and *F. solani* were the predominant species and were present in 91 and 97% of the sites, respectively, whereas members of the Liseola section usually were absent. Soil and debris samples from the soybean fields contained *F. acuminatum*, *F. equiseti*, *F. moniliforme*, *F. oxysporum*, and *F. solani*. *F. graminearum* and *F. semitectum* were found in debris samples but not in soil samples, and *F. chlamydosporum*, *F. compactum*, *F. merismoides*, and *F. proliferatum* were found in soil samples but not in debris samples from soybean fields. *F. anthophilum*, *F. avena*. Phytopathology. Apr 1990. v. 80 (4). p. 343-350. Includes references. (NAL Call No.: DNAL 464.8 P56).

0863

**Genetic control and distorted segregation of T-toxin production in field isolates of *Cochliobolus heterostrophus*.**  
PHYTA. Bronson, C.R. Taga, M.; Yoder, O.C. St. Paul, Minn. : American Phytopathological Society. T-toxin is a family of linear polyketols responsible for the high specific virulence of race T of *Cochliobolus heterostrophus* on cms-T maize. To date, a single locus, *Tox1*, has been shown to be involved in T-toxin synthesis. In an attempt to find additional loci, 12 race T (*Tox+*) and 11 race O (*Tox-*) field isolates were examined. Crosses to genetically defined strains demonstrated that all the race T isolates had the *TOX1* allele and that all the race O isolates had the alternate allele, *tox1*. There was no evidence that these isolates differed at any other loci controlling T-toxin production. Five of the race O isolates carried a factor that caused distorted segregation at *Tox1*. Phytopathology. Sept 1990. v. 80 (9). p. 819-823. Includes references. (NAL Call No.: DNAL 464.8 P56).

(PLANT DISEASES - FUNGAL)

0864

**Genetic diversity in field populations of *Cochliobolus carbonum* on corn in North Carolina.**

PHYTA. Leonard, K.J. Leath, S. St. Paul, Minn. : American Phytopathological Society. Mean frequencies of race 2 (round and oval lesions) and race 3 (long, linear lesions) among 314 isolates of *Cochliobolus carbonum* from corn leaves in 10 North Carolina fields were 0.80 and 0.20 in the western piedmont and 0.82 and 0.18 in eastern North Carolina. Even though races 2 and 3 occurred in the same fields, they were genetically distinct. There were clear distinctions in lesion types, which are polygenically inherited, and the frequencies of cycloheximide tolerance and ability to form pseudothecia differed significantly in the two races. Frequencies of race, mating type, ability to form pseudothecia and ascii with ascospores, and tolerance of cycloheximide and carboxin varied considerably from field to field, even within short geographical distances. This suggests that inoculum dispersal and gene flow among populations is restricted in *C. carbonum*. Calculations of Nei's genetic distances between field populations based on frequencies of these polymorphic traits were not correlated with geographical distance between the fields, indicating that the traits are not good indicators of microevolutionary divergence between populations, probably because the traits are not selectively neutral.

Phytopathology. Nov 1990. v. 80 (11). p. 1154-1159. ill., maps. Includes references. (NAL Call No.: DNAL 464.8 P56).

0865

**Genetics of resistance to aflatoxin contamination of maize with Lfy gene.**

Kang, M.S. Baton Rouge, La. : The Department. Report of projects - Louisiana Agricultural Experiment Station, Department of Agronomy. 1989. p. 78-79. Includes references. (NAL Call No.: DNAL 100 L936).

0866

**Grain yield, stalk rot, and mineral concentration of fertigated corn as influenced by N P K.**

JPNUDS. Bullock, D.G. Gascho, G.J.; Sumner, D.R. New York, N.Y. : Marcel Dekker. Journal of plant nutrition. 1990. v. 13 (8). p. 915-937. Includes references. (NAL Call No.: DNAL QK867.J67).

0867

**High temperature stress-induced severity of disease in maize may involve solubilization of proteins.**

Akhtar, M. Garraway, M.O. Columbia, Mo. : The Interdisciplinary Plant Biochemistry and Physiology Program. Current topics in plant

biochemistry and physiology : Proceedings of the ... Plant Biochemistry and Physiology Symposium held at the University of Missouri, Columbia. 1989. v. 8. p. 280. Includes references. (NAL Call No.: DNAL QK861.P55).

0868

**Host-specific effects of toxin from the rough lemon pathotype of *Alternaria alternata* on mitochondria.**

PLPFA. Akimitsu, K. Kohmoto, K.; Otani, H.; Nishimura, S. Rockville, Md. : American Society of Plant Physiologists. Host-specific toxin from the rough lemon (*Citrus jambhiri* Lush) pathotype of *Alternaria alternata* (ACR toxin) was tested for effects on mitochondria isolated from several citrus species. The toxin caused uncoupling of oxidative phosphorylation and changes in membrane potential in mitochondria from leaves of the susceptible host (rough lemon); the effects differed from those of carbonylcyanide-m-chlorophenylhydrazone, a typical protonophore. ACR toxin also inhibited malate oxidation, apparently because of lack of NAD<sup>+</sup> in the matrix. In contrast, the toxin had no effect on mitochondria from citrus species (Dancy tangerine and Emperor mandarin *Citrus reticulata* Blanco, and grapefruit *Citrus paradisi* Macf.) that are not hosts of the fungus. The effects of the toxin on mitochondria from rough lemon are similar to the effects of a host-specific toxin from *Helminthosporium maydis* (HMT) on mitochondria from T-cytoplasm maize. Both ACR and HMT toxins are highly selective for the respective host plants. HMT toxin and methomyl had no effect (toxic or protective) on the activity of ACR toxin against mitochondria from rough lemon. Plant physiology. Mar 1989. v. 89 (3). p. 925-931. Includes references. (NAL Call No.: DNAL 450 P692).

0869

**Identification of genes governing filamentous growth and tumor induction by the plant pathogen *Ustilago maydis*.**

PNASA. Banuett, F. Washington, D.C. : The Academy. Two master regulatory loci, a and b, govern life-cycle transitions of the phytopathogenic fungus *Ustilago maydis*. Fusion of haploids that differ at both a and b results in production of a filamentous dikaryon, which induces tumors in its host, maize. Here I describe identification of genes distinct from a and b that play roles in these life-cycle transitions. These studies identify three genes, fuz1, fuz2, and rtf1, that are necessary for filament formation. fuz1 is also necessary for normal size and distribution of tumors and for teliospore formation; fuz2 is also necessary for teliospore germination. Mutations in the rtf1 gene, which are recessive, bypass the requirement of different b alleles for tumor formation. This observation indicates that rtf1 codes for a negative regulator of tumor induction. The fuz1, fuz2, and rtf1 genes may be targets for the a and b loci. Proceedings of the National Academy of Sciences

## (PLANT DISEASES - FUNGAL)

of the United States of America. May 1, 1991. v. 88 (9). p. 3922-3926. Includes references. (NAL Call No.: DNAL 500 N21P).

0870

### Incidence of *Bipolaris* and *Exserohilum* species in corn leaves in North Carolina.

PLDIDE. Leonard, K.J. Thakur, R.P.; Leath, S. St. Paul, Minn. : American Phytopathological Society. Plant disease. Dec 1988. v. 72 (12). p. 1034-1038. maps. Includes references. (NAL Call No.: DNAL 1.9 P69P).

0871

### Inheritance of resistance in corn (*Zea mays*) to gray leaf spot.

PHYTAJ. Huff, C.A. Ayers, J.E.; Hill, R.R. Jr. St. Paul, Minn. : American Phytopathological Society. Phytopathology. June 1988. v. 78 (6). p. 790-794. Includes references. (NAL Call No.: DNAL 464.8 P56).

0872

### Inheritance of resistance of *Helminthosporium carbonum* race 3 in maize.

CRPSAY. Halseth, D.E. Pardee, W.D.; Viands, D.R. Madison, Wis. : Crop Science Society of America. Since the early 1970s, several reports of a new helminthosporium leafspot disease of maize (*Zea mays* L.) caused by *Helminthosporium carbonum* Ullstrup (syn. *Bipolaris zeicola* (Stout) Shoemaker) (telom. *Cochliobolus carbonum* Nelson) Race 3 indicate that it has become widespread in the eastern USA and can cause heavy yield losses. This pathogen inflicts a range of symptoms on maize, depending on pathogen isolate and host genotype, confounding the development of screening techniques to identify plant genotypes resistant to this pathogen. The objective of our study was to determine if adequate progress from selection for resistance could be accomplished against a range of polymorphic symptoms by a field breeding program. An eight-parent diallel analysis and a generation mean analysis were used to evaluate the potential for genetic improvement. Inbred maize parents (resistant A239, Ay499, Mo17, and R181; susceptible B8, Co109, W64A, and W182BN) and their F1's, F2's and backcrosses were grown in the field during two seasons and artificially inoculated. Lesion area was subjectively classified into a numerical disease rating scale. The results of the diallel analysis indicated that only general combining ability (GCA) effects, or additive genetic effects, were highly significant. The generation mean analysis confirmed that the additive component was the most important factor, accounting for 52 to 75% of the variation in the models. Dominance and digenic interaction components were occasionally significant. Broad-sense and narrow-sense heritabilities ranged from 58 to 77% and 57 to 67%, respectively, for two seasons. Field

screening techniques to select inbred parents and to evaluate their progeny were found to be satisfactory, but growth chamber evaluations were not always an accurate or reliable predictor of field responses, particularly regarding intermediate disease reaction. Crop science. May/June 1991. v. 31 (3). p. 612-617. Includes references. (NAL Call No.: DNAL 64.8 C883).

0873

### Inheritance of resistance to gray leaf spot of corn.

CRPSAY. Elwinger, G.F. Johnson, M.W.; Hill, R.R. Jr.; Ayers, J.E. Madison, Wis. : Crop Science Society of America. Host plant resistance can play an important role in reducing the severity of gray leaf spot (caused by *Cercospora zeae-maydis* Tehon & Daniels) on corn (*Zea mays* L.). Inheritance of resistance was studied using four generations (inbred, single cross, F2, and backcross) produced from inbred lines PA875, VA59, B68Ht, H93, PA887P, and PA76-22. Four weekly estimates of percent leaf area affected were made on experiments planted at Shenandoah County, Virginia, and Franklin County, Pennsylvania. Disease progress curves were estimated for each genotype using orthogonal polynomial regression. There were significant differences ( $P < 0.05$ ) among genotypes for the mean, linear, and quadratic regression response effects within the inbred, single cross, and backcross generations and for the mean response effect within the F2 generation. No differences were detected among cubic effects in any of the generations. General combining ability (GCA) and specific combining ability (SCA) mean squares were significant ( $P < 0.01$ ) for mean and linear response effects in diallel analyses of single crosses; GCA sums of squares were from 1.8 to 11.5 times larger than SCA sums of squares for these effects. Prediction of single cross performance using information from per se evaluation of inbreds resulted in  $r^2$  values of 0.55 to 0.67 for mean response effects and 0.33 to 0.45 for linear response effects. Prediction of backcross performance using information from diallel analyses resulted in  $r^2$  values of 0.81 to 0.90 for mean response effects and 0.61 to 0.89 for linear response effects. Regression of area under the disease progress curve data onto two models based on complete dominance indicated that dominance was important. For the genotypes studied, a model more complex than simple additivity was required to fully explain inheritance of resistance to gray leaf spot; however, screening of inbreds prior to testing them for combining ability should be effective in eliminating those that are most. Crop science. Mar/Apr 1990. v. 30 (2). p. 350-358. Includes references. (NAL Call No.: DNAL 64.8 C883).

(PLANT DISEASES - FUNGAL)

0874

Inhibition of corn callus growth by *Helminthosporium carbonum* Race 1 toxin.

CRPSAY. Wolf, S.J. Earle, E.D. Madison, Wis. : Crop Science Society of America. Plant tissue culture has potential application in the development of disease-resistant crops and also in the study of host-pathogen interactions in vitro. Pathogen-produced toxins (phytotoxins) can be used as pathogen surrogates in such work. *Helminthosporium carbonum* Race 1, the causal agent for *Helminthosporium* leaf spot of corn (*Zea mays* L.), produces a phytotoxin (HC toxin) known to be the pathogenicity factor for that disease. Tissue cultures were established from corn genotypes susceptible or resistant to H. carbonum Race 1. A toxin preparation with an effective dose (ED50) of 2 micrograms mL<sup>-1</sup> for seedling roots was incorporated into callus growth and regeneration media. Growth of callus derived from genotypes susceptible to the pathogen was inhibited at 5 micrograms mL<sup>-1</sup> toxin, whereas callus from a resistant genotype was inhibited only at 50 micrograms mL<sup>-1</sup> toxin. Regeneration of plants from callus of susceptible genotypes was also inhibited at 5 micrograms mL<sup>-1</sup> toxin, but regeneration of a resistant genotype was not inhibited at 20 micrograms mL<sup>-1</sup> toxin. A total of 5676 calli from the susceptible lines were exposed to toxin concentrations of 2, 5, and 10 micrograms mL<sup>-1</sup>. Both 3 and 15-mo old calli were used. Some cultures were treated with the mutagens sodium azide and ethyl methane sulfonate before exposure to toxin. No resistant callus or plants were recovered from any of the treatments. Failure to recover resistant callus might be due to an inability to identify resistant cells within a relatively slow-growing callus population. Crop science. May/June 1990. v. 30 (3). p. 728-734. Includes references. (NAL Call No.: DNAL 64.8 C883).

highly resistant. However, the ID50 for one moderately resistant line (A509) was 2.3 times greater than the ID50 of the most susceptible line (B79). 3H-Leucine incorporation by wheat and maize was inhibited by DON and T-2 toxin at concentrations occurring in naturally infected tissue, suggesting the need for further evaluation of these compounds as plant disease determinants. Phytopathology. Dec 1988. v. 78 (12,pt.2). p. 1673-1677. Includes references. (NAL Call No.: DNAL 464.8 P56).

0876

Involvement of an inhibitory compound to induced resistance of maize to *Helminthosporium carbonum*.

PHYTA. Cantone, F.A. Dunkle, L.D. St. Paul, Minn. : American Phytopathological Society. In maize, resistance to *Helminthosporium carbonum* race 1 is induced by prior inoculation with race 2. This induced resistance was consistently associated with the production of a compound(s), which reversibly inhibited conidial germination and germ tube elongation. It also prevented growth of phytopathogenic bacteria in a defined medium. The inhibitor was produced and diffused into liquid on the surface of the leaf in all maize lines tested and in response to inoculation with other fungi. When this inhibitory diffusate was added to the conidial inoculum, lesions did not develop on leaves of susceptible genotypes. The host-specific toxin (HC-toxin) produced only by race 1 prevented the synthesis or release of the inhibitor but did not affect its activity in germination bioassays or its ability to prevent lesion development. The results suggest that the inhibitor has a role in induced resistance. Phytopathology. Nov 1990. v. 80 (11). p. 1225-1230. illl. Includes references. (NAL Call No.: DNAL 464.8 P56).

0875

Inhibition of 3H-leucine incorporation by trichothecene mycotoxins in maize and wheat tissue.

PHYTAJ. Casale, W.L. Hart, L.P. St. Paul, Minn. : American Phytopathological Society. The trichothecenes, deoxynivalenol (DON, vomitoxin) and T-2 toxin, inhibited 3H-leucine incorporation into acetone: ethanol insoluble material by maize and wheat tissue (leaf disks and kernel sections). These compounds are known to inhibit protein synthesis in animals and yeast. The toxin concentrations that gave ID50 (50% reduction) for 3H-leucine incorporation by several maize varieties were 0.9 microM T-2 toxin and 9-22 microM DON. ID50 values for wheat were 0.26 microM T-2 toxin and 4.5 microM DON. T-2 toxin gave near-maximum inhibition in leaf tissue within 5 min after exposure to the toxin. T-2 toxin or its effects on 3H-leucine incorporation persisted at least 120 min after removal of leaf disks from toxin solutions. Sensitivity to DON was not correlated with susceptibility to ear rot by a DON-producing strain of *Gibberella zae* (anamorph = *Fusarium graminearum*) for six maize lines with a range of disease reactions from highly susceptible to

0877

Isolation and characterization of a *Pseudomonas* strain that restricts growth of various phytopathogenic fungi.

APMBA. Jayaswal, R.K. Fernandez, M.A.; Schroeder, R.G. III. Washington, D.C. : American Society for Microbiology. The characterization of a novel *Pseudomonas* strain exhibiting antagonism towards many important corn fungal pathogens is presented. This strain was isolated from the caryopses of the grass *Tripsacum dactyloides* and was identified as *Pseudomonas cepacia*. The antagonistic activity is due to the production of an antifungal compound. The chromatographic properties of this partially purified compound isolated from growth medium differ from those reported previously for other pseudomonads. The suppression of the growth of economically important phytopathogens by this strain and by the partially purified compound indicates a potential biocontrol agent. Applied and environmental microbiology. Apr 1990. v. 56 (4). p. 1053-1058. illl. Includes references. (NAL Call No.: DNAL 448.3 AP5).

## (PLANT DISEASES - FUNGAL)

0878

**Isolation of two alleles of the b locus of *Ustilago maydis*.**

PNASA. Kronstad, J.W. Leong, S.A. Washington, D.C. : The Academy. Proceedings of the National Academy of Sciences of the United States of America. Feb 1989. v. 86 (3). p. 978-982. ill. Includes references. (NAL Call No.: DNAL 500 N21P).

0879

**The killer system of *Ustilago maydis*: secreted polypeptides encoded by viruses.**

Koltin, Y. New York, N.Y. : Marcel Dekker. Mycology series. 1988. p. 209-242. ill. Includes references. (NAL Call No.: DNAL QK600.S4).

0880

**Laboratory and field resistance to the European corn borer in maize germplasm.**

CRPSAY. Reid, L.M. Arnason, J.T.; Nozzolillo, C.; Hamilton, R.I. Madison, Wis. : Crop Science Society of America. There is a continuing need to screen maize (*Zea mays* L.) germplasm for sources of resistance to the European corn borer, *Dstrinia nubilalis* (Hubner). This study was conducted to determine the resistance characteristics to a univoltine strain of the European corn borer of six groups of maize germplasm and to examine the relationship among resistance characteristics. The groups of germplasm consisted of (i) a latitudinal series of inbred lines; (ii) a set of the indigenous landraces of Mexico; (iii) two Argentine landraces; (iv) three Canadian synthetic populations; (v) three international Maize and Wheat Improvement Center (CIMMYT) maize pools; and (vi) two inbred lines used as controls. In addition, a multiple borer resistance population was studied. All germplasm was evaluated for seedling DIMBOA

2,4-dihydroxy-7-methoxy(2H)-1,4-benzoxazin-3(-4H)-one content, susceptibility to leaf-feeding (both laboratory and field) and to stalk tunneling by the European corn borer, susceptibility to *Gibberella zeae* (Schwein.) Petch (stalk rot) and *Ustilago zeae* (Beckm.) Unger (corn smut), and their ability to mature in the climatic conditions prevailing at Ottawa, DN. The inbred lines were characterized by high resistance to leaf feeding, but susceptibility to stalk tunneling, whereas the indigenous Mexican landraces were susceptible to leaf feeding. Many significant correlations were found among the various parameters, including validation of the relation of seedling DIMBOA levels and laboratory leaf-feeding tests with the field resistance to European corn borer. This study confirms the importance of examining broad groups of germplasm when searching for sources of resistance to the European corn borer. Crop science. Nov/Dec 1991. v. 31 (6). p. 1496-1502. Includes references. (NAL Call No.: DNAL 64.8 C883).

0881

**Mechanism of resistance to terbinafine in two isolates of *Ustilago maydis*.**

PCBPB. Drth, A.B. Henry, M.J.; Sisler, H.D. Duluth, Minn. : Academic Press. Pesticide biochemistry and physiology. June 1990. v. 37 (2). p. 182-191. Includes references. (NAL Call No.: DNAL SB951.P49).

0882

**A method for genetic analysis of *Glomerella graminicola* (*Colletotrichum graminicola*) from maize.**

PHYTA. Vaillancourt, L.J. Hanau, R.M. St. Paul, Minn. : American Phytopathological Society. Strains derived from nine different isolates of *Colletotrichum graminicola* from maize participated in the production of perithecia when incubated on pieces of autoclaved corn leaves in a humidity chamber. Matings occurred between self-fertile and self-sterile strains, and also between certain self-sterile strains. As many as 200 ascospore progeny were recovered easily from individual perithecia. Characterization of progeny showed that sexual recombination and Mendelian segregation of distinct traits could be detected. Segregation of markers for chlorate resistance (*Ch1R*), benomyl resistance (*Bm1R*), and melanin deficiency (*Mel-*) approximated a 1:1 ratio and defined three separate linkage groups. Crosses involving a pyrimidine auxotroph (*Pyr-*) showed 2:1 segregation (*Pyr+Pyr-*) and linkage between markers for *Pyr-* and *Ch1R*. Attempts to combine multiple markers resulted in successful construction of a *Mel-* *Pyr-* self-fertile strain that was crossed with a *Bm1R* strain to produce offspring with a triple-mutant *Mel-* *Pyr-* *Bm1R* phenotype. Phytopathology. May 1991. v. 81 (5). p. 530-534. ill. Includes references. (NAL Call No.: DNAL 464.8 P56).

0883

**Mode of action of terbinafine in *Ustilago maydis* and characterization of resistant mutants.**

PCBPB. Drth, A.B. Sisler, H.D. Duluth, Minn. : Academic Press. Pesticide biochemistry and physiology. May 1990. v. 37 (1). p. 53-63. ill. Includes references. (NAL Call No.: DNAL SB951.P49).

0884

**Mutations in the maize mitochondrial T-urf13 gene eliminate sensitivity to a fungal pathotoxin.**

PNASA. Braun, C.J. Siedow, J.N.; Williams, M.E.; Levings, C.S. III. Washington, D.C. : The Academy. Proceedings of the National Academy of Sciences of the United States of America. June 1989. v. 86 (12). p. 4435-4439. ill. Includes references. (NAL Call No.: DNAL 500 N21P).

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0885

Mycotoxin formation by *Aspergillus flavus* and *Fusarium graminearum* in irradiated maize grains in the presence of other fungi.

JFPRDR. Cuero, R. Smith, J.E.; Lacey, J. Ames, Iowa : International Association of Milk, Food, and Environmental Sanitarians. Journal of food protection. June 1988. v. 51 (6). p. 452-456. Includes references. (NAL Call No.: DNAL 44.8 J824).

0886

Mycotoxins and *Fusarium* spp. associated with infected ears of corn in Minnesota.

APMBA. Abbas, H.K. Mirocha, C.J.; Meronuck, R.A.; Pokorny, J.D.; Gould, S.L.; Kommedahl, T. Washington, D.C. : American Society for Microbiology. Five *Fusarium* species were isolated from the grain of dent corn (*Zea mays*) selected from 20 to 32 damaged fields in 10 counties in Minnesota on the basis of hyphal growth visible on kernels in the field. Three mycotoxins were identified in the infected ears: zearalenone, deoxynivalenol, and 15-acetyl-deoxynivalenol. This is the first report of the presence of 15-acetyl-deoxynivalenol on corn ears in the field prior to harvest and in combination with deoxynivalenol and zearalenone. Ninety-nine cultures were selected from colonies growing from kernels on agar medium; 30% of the cultures were *F. graminearum*, 23% were *F. subglutinans*, 20% were *F. moniliforme*, 14% were *F. oxysporum*, and 12% were *F. proliferatum*. Applied and environmental microbiology. Aug 1988. v. 54 (8). p. 1930-1933. Includes references. (NAL Call No.: DNAL 448.3 AP5).

0887

A new family of plant antifungal proteins.

MPMIEL. Vigers, A.J. Roberts, W.K.; Selitrennikoff, C.P. St. Paul, Minn. : APS Press. Molecular plant-microbe interactions : MPMI. July/Aug 1991. v. 4 (4). p. 315-323. Includes references. (NAL Call No.: DNAL SB732.6.M65).

0888

Nitidulids as vectors of mycotoxin-producing fungi.

IWRBB. Dowd, P.F. Ames, Iowa : The Station. Research bulletin - Iowa State University, Agricultural and Home Economics Experiment Station. June 1991. (599). p. 335-342. Includes references. (NAL Call No.: DNAL 100 I09).

0889

Occurrence of *Fusarium* species in symptom-free and overwintered cornstalks in northwestern Minnesota.

PLDIDE. Windels, C.E. Kommedahl, T.; Stienstra, W.C.; Burnes, P.M. St. Paul, Minn. : American Phytopathological Society. Plant disease. Nov 1988. v. 72 (11). p. 990-993. maps. Includes references. (NAL Call No.: DNAL 1.9 P69P).

0890

Pathogenesis in *Aspergillus* ear rot of maize: aflatoxin B1 levels in grains around wound-inoculation sites.

PHYTA. Smart, M.G. Shotwell, O.L.; Caldwell, R.W. St. Paul, Minn. : American Phytopathological Society. Aflatoxin contamination of preharvest maize intermittently presents serious problems in grain storage and in animal health. To determine whether this mycotoxin can be translocated through the ear in the absence of hyphae, we harvested 21 grains from around each of 21 wound-inoculation sites of maize ears matured at 34/30 C (day/night). Individual grains were analyzed for aflatoxin by enzyme-linked immunosorbent assay. Maize spikelets are borne in pairs and, if aflatoxin is transported in the rachis, grains in a pair should have similar toxin levels, but nonpaired grains may or may not. Statistical treatment showed that no two grains chosen at random had different average toxin levels: there was no pattern discernible in toxin accumulation. Highly contaminated individual grains rarely had highly contaminated neighbors. Finally, of the 413 grains assayed, almost 80% either were aflatoxin-positive and showed signs of the fungus or were not aflatoxin-positive and had no signs of the fungus. Only 58 grains (14%) had detectable toxin levels without fungal signs. We conclude that long-distance transport of aflatoxin does not occur in infected ears independently of the hyphae. Phytopathology. Dec 1990. v. 80 (12). p. 1283-1286. Includes references. (NAL Call No.: DNAL 464.8 P56).

0891

Pathogenesis in *Aspergillus* ear rot of maize: light microscopy of fungal spread from wounds.

PHYTA. Smart, M.G. Wicklow, D.T.; Caldwell, R.W. St. Paul, Minn. : American Phytopathological Society. We describe the histology of fungal development in maize ears wound inoculated with *Aspergillus flavus*. Plants were inoculated 21 days after seedling emergence; wounded grains and adjacent spikelets (with their rachis segments) were harvested at intervals up to 28 days later. Tissues were processed for plastic embedding and 1.5-micrometer thick sections were examined by bright field microscopy. The fungus spread from the wound sometime after 14 days postinoculation, and at 28 days postinoculation it could be found in small amounts throughout all rachis tissues except the pith and lignified fibers. The fungus entered the

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rachillae of adjacent spikelets from the rachis and also from the bracts at their insertion point. The fungus grew through the aerenchyma in the rachilla to the floral axis and innermost layers of the pericarp (the endocarp). Hyphae did not penetrate to the endocarp from the exterior of the pericarp. The hyphae were always intercellular in the rachis, rachilla, and pericarp. They were both inter- and intracellular in the floral axis and internal to the testa (i.e., inside the seed proper). From the endocarp, entry into the seed was not across the black layer; random tears in the testa over the embryo were the probable immediate pathway. Hyphae were vacuolate everywhere except in the seed. Host cells died (and even collapsed) ahead of the fungus, but no other structural alterations were seen. *Phytopathology*. Dec 1990. v. 80 (12). p. 1287-1294. ill. Includes references. (NAL Call No.: DNAL 464.8 P56).

0892

**Pathological and physiological identification of race C of Bipolaris maydis in China.**  
PHYTAJ. Wei, J.K. Liu, K.M.; Chen, J.P.; Luo, P.C.; Lee-Stadelmann, O.Y. St. Paul, Minn. : American Phytopathological Society. *Phytopathology*. May 1988. v. 78 (5). p. 550-554. ill. Includes references. (NAL Call No.: DNAL 464.8 P56).

0893

**Peritheciun production in Fusarium graminearum populations and lack of correlation with zearalenone production.**  
MYCOAE. Windels, C.E. Mirocha, C.J.; Abbas, H.K.; Xie, W. Bronx, N.Y. : The New York Botanical Garden. *Mycologia*. Mar/Apr 1989. v. 81 (2). p. 272-277. Includes references. (NAL Call No.: DNAL 450 M99).

0894

**Potential biological control agents for goosegrass (*Eleusine indica*).**  
WEESA6. Figliola, S.S. Camper, N.D.; Ridings, W.H. Champaign, Ill. : Weed Science Society of America. Two leaf-spotting pathogens, *Bipolaris setariae* (Saw.) and *Piricularia grisea* (Cke.) Sacc. , were isolated from severely infected goosegrass plants. Pathogenicity tests conducted at 28 C showed that both fungi were 100% effective in infecting goosegrass when given a 72-h dew period. Dew period temperature and duration requirements were tested by inoculating 2-week-old plants with conidial suspensions of each fungus and incubating them in dew chambers (100% relative humidity). Disease index increased as dew period duration increased for both fungi and at all temperatures tested. Infection occurred at all temperatures with an optimum of 24 to 28 C for *B. setariae* and 28 C for *P. grisea*. In host range tests, representative plants of the Fabaceae,

Malvaceae, Poaceae, and Solanaceae were inoculated with suspensions of either 20000 or 60000 spores/ml of each fungus and placed in growth chambers at 28 C. Infection was limited to members of the Poaceae. Sorghum, showed a hypersensitive response to *B. setariae*. Both cultivars of corn developed light symptoms in response to both fungi at 20000 and 60000 spores/ml. *Weed science*. Nov 1988. v. 36 (6). p. 830-835. Includes references. (NAL Call No.: DNAL 79.8 W41).

0895

**Preharvest kernel infection by Aspergillus flavus for resistant and susceptible maize hybrids.**

CRPSAY. Scott, G.E. Zummo, N. Madison, Wis. : Crop Science Society of America. Kernel infection of maize, *Zea mays* L., by *Aspergillus flavus* Link ex Fr. and subsequent aflatoxin production is a frequent and serious problem in the southeastern USA. Some maize inbreds with resistance to kernel infection by *A. flavus* in the field have been identified. The objective of this study was to compare the level of kernel infection by *A. flavus* for 15 crosses among six resistant inbreds with 15 crosses among six susceptible inbreds. The top ear of each plant was inoculated with the fungal spores using the pinbar inoculation technique. Crosses among resistant inbreds averaged 16.6% infected kernels compared with 30.4% for hybrids among susceptible inbreds during 2 yr of testing. Thus, incidence of *A. flavus* kernel infection in resistant crosses was 45% less than for hybrids of susceptible inbreds. *Crop science*. Mar/Apr 1990. v. 30 (2). p. 381-383. Includes references. (NAL Call No.: DNAL 64.8 C883).

0896

**Production of a novel steroid sulfate metabolite**

**4,4,24-trimethylcholesta-8,14,24(28)-trien-2 alpha,3 beta,11 alpha,12 beta-tetrol 12-acetate, 3-sulfate by Fusarium species and its biological activity.**  
APMBA. Burmeister, H.R. Vesonder, R.F. Washington, D.C. : American Society for Microbiology. A novel steroid sulfate, 4,4,24-trimethylcholesta-8,14,24(28)-trien-2 alpha,3 beta,11 alpha,12 beta-tetrol 12-acetate, 3-sulfate, was discovered in *Fusarium* spp. Forty *Fusarium* strains belonging to *F. sporotrichioides*, *F. chlamydosporum*, *E. equiseti*, *F. acuminatum*, *F. sambucinum*, *F. culmorum*, and *F. graminearum* produced the steroid on white corn grits at 25 degrees C for 20 days. This steroid sulfate is one of the more abundant and easily attainable microbial steroids. At a concentration of 160 micrograms/ml, it inhibited the growth of six fungi, two gram-positive bacteria, and an alga, as well as the germination of both wheat and tomato seeds. *Applied and environmental microbiology*. Oct 1990. v. 56 (10). p. 3209-3212. Includes references. (NAL Call No.: DNAL 448.3 AP5).

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0897

### Production of fumonisins by *Fusarium moniliforme* strains from various substrates and geographic areas.

APMBA. Nelson, P.E. Plattner, R.D.; Shackelford, D.D.; Desjardins, A.E. Washington, D.C. : American Society for Microbiology. Strains of *Fusarium moniliforme* from different geographic areas and from corn and other substrates were tested for the ability to produce fumonisins in culture. The test results indicate that the potential exists for production of fumonisins by such strains in agricultural commodities and other substrates in widespread geographic areas. Applied and environmental microbiology. Aug 1991. v. 57 (8). p. 2410-2412. Includes references. (NAL Call No.: DNAL 448.3 AP5).

0898

### Production of fusarin C on cereal and soybean by *Fusarium moniliforme*.

APMBA. Bacon, C.W. Marijanovic, D.R.; Norred, W.P.; Hinton, D.M. Washington, D.C. : American Society for Microbiology. Two isolates of *Fusarium moniliforme* were compared with respect to production of a mutagenic compound, fusarin C, on seven corn varieties as well as on soybean, wheat, rye, barley, and a liquid culture medium. The isolates were originally obtained from corn and barley. Both isolates produced fusarin C on seed of all five crops within a 21-day period, and one isolate produced the largest amount on oats. Soybean was the poorest substrate for both isolates. Although the quantity of fusarin C produced on grain was isolate dependant, specific substrate requirements for each strain were suggested. The isolates differed in their ability to grow and produce fusarin C on corn with different moisture contents (16, 20, 24, and 28%). One isolate was more xerotolerant and grew at 16% moisture but did not produce the mutagen. Applied and environmental microbiology. Nov 1989. v. 55 (11). p. 2745-2748. Includes references. (NAL Call No.: DNAL 448.3 AP5).

0899

### Reaction of two maize synthetics to anthracnose stalk rot and northern corn leaf blight following recurrent selection for resistance to *Diplodia* stalk rot and European corn borer.

PHYTAJ. Nyhus, K.A. Russell, W.A.; Guthrie, W.D.; Martinson, C.A. St. Paul, Minn. : American Phytopathological Society. Two maize (*Zea mays*) synthetics, BSAA and BSBB, were recurrently selected for resistance to *Diplodia* (*Diplodia maydis*) stalk rot (DSR) and leaf feeding caused by the first-generation European corn borer (*Ostrinia nubilalis*) (ECB), based on the reaction of S1 lines to artificial inoculations of *D. maydis* and artificial infestations of the ECB. This study was conducted to determine if plant factors contributing to DSR and ECB resistance also conferred resistance to anthracnose stalk rot (ASR) caused by *Colletotrichum graminicola* and

northern corn leaf blight (NLB) caused by *Exserohilum turcicum*. Highly significant linear improvements in ASR resistance were observed over cycles (C0 to C4) of selection in both synthetics. These improvements mirrored the gains reported previously for DSR resistance in BSAA and BSBB and suggested that a genetic correlation exists between DSR resistance and ASR resistance in these populations. NLB severity ratings were recorded on six dates throughout the growing season. A natural logarithm transformation was used to describe the disease progress curve for each of the C0 to C4 populations of each synthetic. Linear regression of lnNLB ratings on lnDATE (days after inoculation) accounted for more than 97% of the variation among entries when averaged over replications. Our results showed no concomitant improvement in NLB resistance over cycles of selection for ECB resistance, contradicting previous reports that 2,4-dihydroxy-7-methoxy-2H-1,4-benzoxazin-3-one (DIMBOA), a known biochemical factor in leaf-feeding resistance, confers resistance to NLB. Phytopathology. Feb 1989. v. 79 (2). p. 166-169. Includes references. (NAL Call No.: DNAL 464.8 P56).

0900

### Registration of eight maize germplasm sources for gray leaf spot (GLS) resistance.

CRPSAY. Johnson, M.W. Ayers, J.E. Madison, Wis. : Crop Science Society of America. Crop science. Sept/Oct 1988. v. 28 (5). p. 871-872. Includes references. (NAL Call No.: DNAL 64.8 C883).

0901

### Registration of Mp313E parental line of maize.

CRPSAY. Scott, G.E. Zummo, N. Madison, Wis. : Crop Science Society of America. Crop science. Nov/Dec 1990. v. 30 (6). p. 1378. Includes references. (NAL Call No.: DNAL 64.8 C883).

0902

### Registration of NC264 parental line of maize.

CRPSAY. Sisco, P.H. Goodman, M.M.; Thompson, D.L. Madison, Wis. : Crop Science Society of America. Crop science. Jan/Feb 1989. v. 29 (1). p. 248. Includes references. (NAL Call No.: DNAL 64.8 C883).

0903

### Registration of PA356, PA376 and PA891 parental lines of maize.

CRPSAY. Johnson, M.W. Madison, Wis. : Crop Science Society of America. Crop science. Sept/Oct 1989. v. 29 (5). p. 1333-1334. (NAL Call No.: DNAL 64.8 C883).

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0904

### Registration of RBS10 (S1 + HS) C3 corn germplasm.

CRPSAY. Lambert, R.J. Madison, Wis. : Crop Science Society of America. Crop science. Nov/Dec 1989. v. 29 (6). p. 1580. Includes references. (NAL Call No.: DNAL 64.8 C883).

0905

### Registration of SD43 parental line of maize.

CRPSAY. Wicks, Z.W. III. Carson, M.L.; Scholten, G.G. Madison, Wis. : Crop Science Society of America. Crop science. Nov/Dec 1988. v. 28 (6). p. 1041. Includes references. (NAL Call No.: DNAL 64.8 C883).

0906

### Registration of three yellow dent maize lines R225, R226, and R227.

CRPSAY. Lambert, R.J. Madison, Wis. : Crop Science Society of America. Crop science. Nov/Dec 1989. v. 29 (6). p. 1586-1587. Includes references. (NAL Call No.: DNAL 64.8 C883).

0907

### Relationship between leaf freckles and wilt severity and yield losses in closely related maize hybrids.

PHYTA. Carson, M.L. Wicks, Z.W. III. St. Paul, Minn. : American Phytopathological Society. The relationship between severity of leaf freckles and wilt, caused by *Clavibacter michiganense* subsp. *nebrascense*, and the percentage of grain yield loss was examined in a set of 42 closely related maize hybrids. Forty-two sister inbred lines, derived from a modified backcrossing program that used the inbred A632 as the recurrent parent, were crossed to A619. The resulting hybrids were evaluated over 2 yr in a split-plot field experiment with hybrids as whole plots and inoculated vs. uninoculated treatments as split plots. The hybrids varied widely in reaction to leaf freckles and wilt and in yield loss sustained from the disease. The percentages of yield loss were significantly correlated with disease severities in both years and in the combined analysis. Several hybrids had high disease severity but sustained insignificant yield loss compared with susceptible hybrids, indicating possible leaf freckles and wilt tolerance. However, when a more rigorous test of tolerance that used studentized residuals from the loss-severity regression was applied to the data, tolerance appeared to be an unstable character. Resistance to leaf freckles and wilt was not related to poor grain yield in the absence of disease. *Phytopathology*. Jan 1991. v. 81 (1). p. 95-98. Includes references. (NAL Call No.: DNAL 464.8 P56).

0908

### Relationships among ear morphology, western flower thrips, and *Fusarium* ear rot of corn.

PHYTA. Farrar, J.J. Davis, R.M. St. Paul, Minn. : American Phytopathological Society. The relationships among insects, corn (*Zea mays*) ear morphology, and ear rot caused by *Fusarium moniliforme* were studied in 1988 and 1989. Silks on ears of two corn hybrids, one susceptible to *Fusarium* ear rot and one with an intermediate level of resistance, received applications of the insecticides acephate or carbaryl at the green silk stage before the onset of ear rot symptoms. In both years, insecticide treatments reduced intra-ear populations of western flower thrips (*Frankliniella occidentalis*) at the brown silk stage and reduced disease incidence at maturity. In 1989, 15 corn hybrids, representing a range of susceptibility to *Fusarium* ear rot, were examined for ear morphology factors that may be correlated with disease incidence. Factors examined were heat units to silking; days from initial green silk to yellow-brown silk and to brown silk stages; intra-ear thrips populations at the green, yellow-brown, and brown silk stages; and husk looseness at the yellow-brown and brown silk stages. Disease incidence was correlated with thrips populations at the brown silk stage and with husk looseness at the brown silk stage but was not correlated with the other factors measured. Hybrids also could be separated by contrast analysis into susceptible, intermediate, and resistant groups on the basis of thrips populations and husk looseness at the brown silk stage. On the basis of these data, intra-ear thrips populations and husk tightness at the brown silk stage are important in the epidemiology of *Fusarium* ear rot. *Phytopathology*. June 1991. v. 81 (6). p. 661-666. Includes references. (NAL Call No.: DNAL 464.8 P56).

0909

### Relationships between yield of three maize hybrids and severity of southern leaf blight caused by race 0 of *Bipolaris maydis*.

PLDIDE. Byrnes, K.J. Pataky, J.K.; White, D.G. St. Paul, Minn. : American Phytopathological Society. Plant disease. Oct 1989. v. 73 (10). p. 834-840. Includes references. (NAL Call No.: DNAL 1.9 P69P).

0910

### Relative aggressiveness of *Aspergillus flavus* and *A. parasiticus* on maize in Mississippi.

PLDIDE. Zummo, N. Scott, G.E. St. Paul, Minn. : American Phytopathological Society. Plant disease. Dec 1990. v. 74 (12). p. 978-981. Includes references. (NAL Call No.: DNAL 1.9 P69P).

## (PLANT DISEASES - FUNGAL)

0911

**Resistance in susceptible maize to *Helminthosporium carbonum* race 1 induced by prior inoculation with race 2.**  
PHYTA. Cantone, F.A. Dunkle, L.D. St. Paul, Minn. : American Phytopathological Society. Inoculation of leaves of susceptible maize genotypes with the nonpathogenic race 2 of *Helminthosporium carbonum* at least 10 hr before inoculation with the pathogenic race 1 prevented development of large lesions typical of the susceptible reaction. Appressorium formation, penetration, and hyphal growth by the pathogen were decreased. Addition of HC-toxin (the host-specific toxin produced by pathogenic race 1) to the race 1 challenge inoculum abolished the resistance induced by race 2. Inoculation with *H. victoriae*, *H. turcicum*, or *Alternaria* sp. at least 18 hr before inoculation with *H. carbonum* race 1 also induced resistance. The results suggest that a general resistance mechanism is activated upon contact of the maize leaf with a potential pathogen and that HC-toxin plays a role in pathogenesis by preventing or overcoming those events. *Phytopathology*. Nov 1990. v. 80 (11). p. 1221-1224. ill. Includes references. (NAL Call No.: DNAL 464.8 P56).

0912

**Response of two maize synthetics to recurrent selection for resistance to first-generation European corn borer (Lepidoptera: Pyralidae) and Diplodia stalk rot.**  
JEENAI. Nyhus, K.A. Russell, W.A.; Guthrie, W.D. Lanham, Md. : Entomological Society of America. *Journal of economic entomology*. Includes statistical data. Dec 1988. v. 81 (6). p. 1792-1798. Includes references. (NAL Call No.: DNAL 421 J822).

0913

**The role of deoxynivalenol and 15-Acetyldeoxynivalenol in pathogenesis by *Gibberella zaeae*, as elucidated through protoplast fusions between toxicogenic and nontoxicogenic strains.**  
PHYTA. Adams, G.C. Hart, L.P. St. Paul, Minn. : American Phytopathological Society. Deoxynivalenol (DON) and 15-acetyldeoxynivalenol (15-ADON) are trichothecene mycotoxins produced by *Gibberella zaeae*, a pathogen of wheat, maize, and carnation. Low levels of DON inhibit protein synthesis in maize and wheat. We tested the possible role of DON and 15-ADON as virulence factors in inoculation experiments with regenerated products of protoplast fusion of auxotrophs of a toxicogenic, pathogenic strain (type A) with auxotrophs of a nontoxicogenic, nonpathogenic strain (type B). Nineteen independent fusion products and their parental strains were evaluated for toxin formation and pathogenicity on four cultivars of maize and one cultivar of carnation. Toxin production was analyzed by thin-layer chromatography of extracts from infected maize and rice grains

and by axenic liquid cultures. Fourteen fusion products were nontoxic, but eight of these were highly virulent ear mold pathogens of maize and stub dieback pathogens of carnation. We conclude that DON and 15-ADON are not pathogenicity or virulence factors for *G. zaeae* on maize or carnation. *Phytopathology*. Apr 1989. v. 79 (4). p. 404-408. Includes references. (NAL Call No.: DNAL 464.8 P56).

0914

**Root diseases, populations of soil fungi, and yield decline in continuous double-crop corn.**  
PLDIDE. Sumner, D.R. Gascho, G.J.; Johnson, A.W.; Hook, J.E.; Threadgill, E.D. St. Paul, Minn. : American Phytopathological Society. Plant disease. Sept 1990. v. 74 (9). p. 704-710. Includes references. (NAL Call No.: DNAL 1.9 P69P).

0915

**Seed corn growers combat stalk rot.**  
SWORAX. Des Plains, Ill. : Scranton Gillette Communications, Inc. *Seed world*. Oct 1991. v. 129 (11). p. 12, 15. (NAL Call No.: DNAL 61.8 SE52).

0916

**Some effects of mineral nutrition on aflatoxin contamination of corn and peanuts.**  
Wilson, D.M. Walker, M.E.; Gascho, G.J. St. Paul, Minn. : APS Press, c1989. *Soilborne plant pathogens : management of diseases with macro- and microelements / edited by Arthur W. Engelhard*. p. 137-151. Includes references. (NAL Call No.: DNAL SB732.87.S66).

0917

**Sources of resistance in maize to kernel infection by *Aspergillus flavus* in the field.**  
CRPSAY. Scott, G.E. Zummo, N. Madison, Wis. : Crop Science Society of America. *Crop science*. May/June 1988. v. 28 (3). p. 504-507. Includes references. (NAL Call No.: DNAL 64.8 C883).

0918

**Spread of corn anthracnose from surface residues in continuous corn and corn-soybean rotation plots.**  
PHYTAJ. Lipps, P.E. St. Paul, Minn. : American Phytopathological Society. *Phytopathology*. June 1988. v. 78 (6). p. 756-761. Includes references. (NAL Call No.: DNAL 464.8 P56).

## (PLANT DISEASES - FUNGAL)

0919

### **Stalk quality and stalk rot resistance of tropical hybrid maize derivatives.**

PLDIDE. Holley, R.N. Goodman, M.M. St. Paul, Minn. : American Phytopathological Society. Plant disease. Apr 1988. v. 72 (4). p. 321-324. Includes references. (NAL Call No.: DNAL 1.9 P69P).

putatively incomplete adhesion of haustorial mother cells to mesophyll cells. In the nonhost, although no secondary hyphae were formed, some haustorial mother cells were formed, and a significant proportion of primary hyphae did not form haustorial mother cells and/or secondary hyphae. Phytopathology. June 1991. v. 81 (6). p. 596-602. Includes references. (NAL Call No.: DNAL 464.8 P56).

0920

### **The Texas cytoplasm of maize: cytoplasmic male sterility and disease susceptibility.**

SCIEA. Levings, C.S. III. Washington, D.C. : American Association for the Advancement of Science. The Texas cytoplasm of maize carries two cytoplasmically inherited traits, male sterility and disease susceptibility, which have been of great interest both for basic research and plant breeding. The two traits are inseparable and are associated with an unusual mitochondrial gene, T-urf13, which encodes a 13-kilodalton polypeptide (URF13). An interaction between fungal toxins and URF13, which results in permeabilization of the inner mitochondrial membrane, accounts for the specific susceptibility to the fungal pathogens. Science. Nov 16, 1990. v. 250 (4983). p. 942-947. Includes references. (NAL Call No.: DNAL 470 SCI2).

0923

### **Using ELISA kits to test corn for aflatoxin.**

AAREZ. Wilcke, W.F. Ehrich, M.R.; Ko, K.W. New York, N.Y. : Springer. Two brands of commercially available, enzyme linked immunosorbent assays (ELISAs) were evaluated for use in screening corn samples for aflatoxins in nonlaboratory situations (e.g., at elevators or off farms). The ELISAs were reliable aflatoxin detectors if all direction were carefully followed, but the tests indicated more aflatoxins than was actually present for up to 17% of the samples, and the tests were faster and more accurate if conducted in a laboratory by trained personnel. Applied agricultural research. Winter 1990. v. 5 (1). p. 32-36. Includes references. (NAL Call No.: DNAL S539.5.A77).

0921

### **Translational alterations in maize leaves responding to pathogen infection, paraquat treatment, or heat shock.**

PLPFA. Wu, C.H. Warren, H.L.; Sitaraman, K.; Tsai, C.Y. Rockville, Md. : American Society of Plant Physiologists. Plant physiology. Apr 1988. v. 86 (4). p. 1323-1325. illl. Includes references. (NAL Call No.: DNAL 450 P692).

0924

### **Variation in expression of monogenic resistance in corn to *Exserohilum turcicum* race 3 under different temperature and light regimes.**

PHYTA. Leath, S. Thakur, R.P.; Leonard, K.J. St. Paul, Minn. : American Phytopathological Society. Expression of monogenic resistance in near-isogenic corn inbred lines H4460Ht1, H4460Ht2, and H4460Ht3 against isolates of races 1 and 3 of *Exserohilum turcicum* was determined under different temperature and light intensity regimes. These environmental conditions influenced lesion type, number, length, and sporulation of the fungus. In general, isolates of *E. turcicum* produced more lesions at 22/18 than at 26/22 C and more lesions at 162 or 324 than at 647 micromol m<sup>-2</sup> s<sup>-1</sup> at 22/18 C. Lesions also were larger ( $P = 0.05$ ) at the reduced light intensities. Virulence of three races of *E. turcicum* was clearly expressed and consistent with earlier reports at 22/18 C day/night temperature and low light intensity (324 or 162 micromol m<sup>-2</sup> s<sup>-1</sup>), but inconsistencies arose at 26/22 C day/night temperature and 647 micromol m<sup>-2</sup> s<sup>-1</sup> light intensity. Resistance of Ht1, Ht2, and Ht3 often was incomplete at 22/18 C day/night temperature and low light intensity. Race 3 could be readily recognized at a 22/18 C day/night temperature regime with the differential reaction clearest at a light intensity of 324 micromol m<sup>-2</sup> s<sup>-1</sup>. Phytopathology. Mar 1990. v. 80 (3). p. 309-313. illl. Includes references. (NAL Call No.: DNAL 464.8 P56).

0922

### **Ultrastructural morphology of *Uromyces transversalis* infection of resistant and susceptible gladiolus hosts and a nonhost, *Zea mays*.**

PHYTA. Ferreira, J.F. Rijkenberg, F.H.J. St. Paul, Minn. : American Phytopathological Society. The infection structures of gladiolus rust, *Uromyces transversalis*, on and in host leaves of the susceptible gladiolus cultivar (Goldfield) and resistant species (*Gladiolus dalenii*) and in leaves of the nonhost (*Zea mays*) were examined by scanning and transmission electron microscopy. The number of germinated urediospores that formed appressoria on the resistant host was significantly fewer than the number formed on the susceptible host. The major determinant of resistance in the host was manifested in the significant proportion of substomatal vesicles with primary hyphae that aborted before the formation of haustorial mother cells and/or secondary hyphae. This was correlated with a similar reaction in the nonhost. The abortion was attributed to the

(PLANT DISEASES - FUNGAL)

0925

**Yield response of corn hybrids and inbred lines to phylloplane treatment with mycopathogenic fungi.**  
CRPSAY. Vakili, N.G. Bailey, T.B. Jr. Madison, Wis. : Crop Science Society of America. This study was part of a larger investigation on the biological control of stalk rot of corn (*Zea mays L.*) through application of mycopathogenic fungi on above-ground surface (phylloplane) of the corn plant conducted at Iowa State University, Ames, IA. The objectives were to determine if grain yield is an effective trait for testing the interaction of selected mycopathogenic fungi with corn genotypes and whether the application of mycopathogens to the corn phylloplane had an effect on yield. Seven corn hybrids and nine inbred lines were planted in a Spillville clay loam (fine-loamy, mixed mesic Cumulic Hapludoll) with three cultural histories: oat (*Avena sativa L.*)-corn-soybean *Glycine max (L.) Merr.* rotation, continuous corn cultivation, and fumigation. Plants were treated in the phylloplane with aqueous spore suspension of mycopathogens *Gliocladium roseum* (Link) Bainier, *Gonatobotrys simplex* Corda, and *Sphaeronaemella helvella* (Karsten) Seeler, and water as control. Hybrid yields were not affected by the treatments, whereas inbred yields differed significantly. Fumigation of the soil with methyl isothiocyanate resulted in a significant response by inbreds to treatment with mycopathogens, which was primarily due to *G. roseum*. Differences in the yields of the inbreds planted in corn-soybean-oat rotation were nonsignificant. Variation in the yield of the inbreds indicated that there was a highly significant interaction between inbred genotypes and mycopathogens in continuous corn culture and in fumigated soils. Inbreds B73 and Va26 had the most varied responses to the mycopathogens, whereas B85 and W629A had the least. Selection and breeding of inbreds with high yield response to mycopathogens could result in genotypes, that, in the presence of a compatible mycopathogen, would suppress stalk rot development and have greater yield potentials. *Crop science*. Jan/Feb 1989. v. 29 (1). p. 183-190. illl. Includes references. (NAL Call No.: DNAL 64.8 C883).

0926

**A 13-Kilodalton maize mitochondrial protein in *Escherichia coli* confers sensitivity to *Bipolaris maydis* toxin.**  
SCIEA. Dewey, R.E. Siedow, J.N.; Timothy, D.H.; Levings, C.S. III. Washington, D.C. : American Association for the Advancement of Science. *Science*. Jan 15, 1988. v. 239 (4837). p. 293-295. Includes references. (NAL Call No.: DNAL 470 SCI2).

0927

**1989 corn performance tests.**

GARRA. Day, J.L. Raymer, P.L.; Gipson, R.D. Athens, Ga. : The Stations. Research report - University of Georgia, College of Agriculture, Agricultural Experiment Stations. Nov 1989. (585). p. 1-25. (NAL Call No.: DNAL S51.E22).

# PLANT DISEASES - BACTERIAL

0928

**Characterization of a gene cluster that specifies pathogenicity in *Erwinia stewartii*.**  
MPMIEL. Coplin, D.L. Frederick, R.D.; Majerczak, D.R.; Tuttle, L.D. St. Paul, Minn. : APS Press. Molecular plant-microbe interactions : MPMI. Jan/Feb 1992. v. 5 (1). p. 81-88. Includes references. (NAL Call No.: DNAL SB732.6.M65).

0929

***Curtobacterium plantarum* sp. nov. is ubiquitous in plant leaves and is seed transmitted in soybean and corn.**  
IJSBBA8. Dunleavy, J.M. Washington, D.C. : International Union of Microbiological Societies. International journal of systematic bacteriology. July 1989. v. 39 (3). p. 240-249. illl. Includes references. (NAL Call No.: DNAL 448.3 IN8).

0930

**Development of an immunoassay for seedborne *Erwinia stewartii* in corn seeds.**  
PHYTA. Lamka, G.L. Hill, J.H.; McGee, D.C.; Braun, E.J. St. Paul, Minn. : American Phytopathological Society. Specificity of polyclonal and monoclonal antibodies generated to *Erwinia stewartii* was determined by testing 167 bacterial strains in enzyme-linked immunoassay (ELISA). Of these, the antibodies were positive to all 43 *E. stewartii* strains tested. Reaction of the monoclonal antibody to all other bacterial strains was negative. However, the polyclonal antibodies reacted with seven of 105 nonpathogenic bacteria from corn plants and seeds determined not to be virulent *E. stewartii*. A double-sandwich ELISA that used the polyclonal and monoclonal antibodies was developed to detect *E. stewartii* in ground corn-seed samples. A comparison of four ELISA procedures to detect *E. stewartii* in pure culture and mixed with corn-seed tissue revealed that the most appropriate procedure was a double-sandwich ELISA using polyclonal antibodies for capture and monoclonal antibodies for detection. The assay detected *E. stewartii* antigen in seeds from plants inoculated with a rifampicin and nalidixic acid tolerant strain of *E. stewartii* but not in seeds from uninoculated plants. The presence of viable *E. stewartii* in seeds from inoculated plants was confirmed by culture. Analyses of 400 single seeds showed an absolute positive correlation between recovery of bacteria and ELISA response in eight seeds. *E. stewartii* was recovered from 10 other seeds that had a negative ELISA response. Recovered bacterial populations in nine of these 10 seeds were below the threshold of detection by ELISA. Phytopathology. Aug 1991. v. 81 (8). p. 839-846. Includes references. (NAL Call No.: DNAL 464.8 P56).

0931

**Effect of plant species and environmental conditions on epiphytic population sizes of *Pseudomonas syringae* and other bacteria.**  
PHYTA. O'Brien, R.D. Lindow, S.E. St. Paul, Minn. : American Phytopathological Society. Selected biological and environmental effects influenced epiphytic colonization of plants by *Pseudomonas syringae*, *Escherichia coli*, *Salmonella typhimurium*, *Aeromonas hydrophila*, and *Rhizobium meliloti* when tested in a growth chamber at 24 C. Epiphytic population size varied with plant host, environmental conditions, and among strains of *P. syringae* tested. Strains of *P. syringae* achieved only slightly larger population sizes than strains from other genera when incubated on inoculated plants for 48 hr, and near 100% relative humidity (RH). However, the strains of *P. syringae* maintained populations at least 25 times higher after a subsequent 72 hr at 40% RH. Epiphytic population sizes of 15 different strains of *P. syringae* varied up to 10-fold on a given plant species, indicating epiphytic diversity within this bacterial species. Relative population sizes of three strains of *P. syringae* on plants under field conditions were predicted by growth chamber populations. Neither epiphytic strains, pathogenic strains, or toxin producing groups were associated with greater epiphytic population sizes. Different plant species varied up to 17-fold in the size of bacterial populations supported. Maceration of inoculated plant tissue increased bacterial population size estimates relative to cells removed by sonication, but only after low RH incubations. Phytopathology. May 1989. v. 79 (5). p. 619-627. Includes references. (NAL Call No.: DNAL 464.8 P56).

0932

**Effects of zinc, iron, cobalt, and manganese on *Fusarium moniliforme* NRRL 13616 growth and fusarin C biosynthesis in submerged cultures.**  
APMBA. Jackson, M.A. Slininger, P.J.; Bothast, R.J. Washington, D.C. : American Society for Microbiology. The influence of zinc, iron, cobalt, and manganese on submerged cultures of *Fusarium moniliforme* NRRL 13616 was assessed by measuring dry weight accumulation, fusarin C biosynthesis, and ammonia assimilation. Shake flask cultures were grown in a nitrogen-limited defined medium supplemented with various combinations of metal ions according to partial-factorial experimental designs. Zinc (26 to 3,200 ppb 26 to 3,200 ng/ml) inhibited fusarin C biosynthesis, increased dry weight accumulation, and increased ammonia assimilation. Carbohydrate was found to be the principal component of the increased dry weight in zinc-supplemented cultures. Zinc-deficient cultures synthesized more lipid and lipidlike compounds, such as fusarin C, than did zinc-supplemented cultures. Microscopic examination showed that zinc-deficient hyphae contained numerous lipid globules which were not present in zinc-supplemented cultures. Addition of zinc (3,200 ppb) to 2- and 4-day-old cultures inhibited further fusarin C biosynthesis but did not stimulate additional

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dry weight accumulation. Iron (10.0 ppm) and cobalt (9.0 ppm) did not affect fusarin C biosynthesis or dry weight accumulation. Manganese (5.1 ppm) did not affect dry weight accumulation but did increase fusarin C biosynthesis in the absence of zinc. Maximum fusarin C levels, 32.3 microgram/mg (dry weight), were produced when cultures were supplied manganese, whereas minimum fusarin C levels, 0.7 microgram/mg (dry weight), were produced when zinc, iron, cobalt, and manganese were supplied. These results suggest a multifunctional role for zinc in affecting *F. moniliforme* metabolism. Applied and environmental microbiology. Mar 1989. v. 55 (3). p. 649-655. ill. Includes references. (NAL Call No.: DNAL 448.3 AP5).

0933

**Genetic studies of resistance in maize (*Zea mays L.*) to Goss's bacterial wilt and blight (*Clavibacter michiganense ssp. nebrascense*).**  
JOHEA. Rochedford, T.R. Gardner, C.O.; Vidaver, A.K. Washington, D.C. : American Genetic Association. The Journal of heredity. Sept/Oct 1989. v. 80 (5). p. 351-356. Includes references. (NAL Call No.: DNAL 442.8 AM3).

0934

**Goss's wilt of corn.**  
WAEBIA. Vincelli, P.C. Laramie, Wyo. : The Station. B - Wyoming Agricultural Experiment Station. Nov 1988. (913). 2 p. ill. (NAL Call No.: DNAL 100 W99 (1)).

0935

**Influence of plant spacing and nitrogen fertilization in maize on *Dalbulus maidis* (Homoptera: Cicadellidae), vector of corn stunt.**  
EVETEX. Power, A.G. Lanham, Md. : Entomological Society of America. The incidence of the corn stunt pathogen transmitted to maize by the corn leafhopper, *Dalbulus maidis* (Delong and Wolcott), was reduced in high-density plantings of maize (*Zea mays mays L.*) in Nicaragua. Density was manipulated by modifying the distance between rows or between plants within a row. Although leafhopper populations were not strongly influenced by planting density in this study, the planting arrangement significantly affected leafhopper abundance. At equivalent planting densities, leafhoppers were more abundant in treatments with reduced between-row spacing. This difference was not reflected in the incidence of corn stunt, which tended to be lower in treatments with reduced row spacing. This result can be explained by the effects of planting arrangement on leafhopper movement. In contrast to a previous study, nitrogen fertilization affected maize growth early in the season, but did not significantly influence vector abundance or disease incidence. Environmental entomology. June 1989. v. 18 (3). p. 494-498. Includes references. (NAL Call No.:

DNAL QL461.E532).

0936

**Inheritance of resistance to Goss's wilt in maize.**

CRPSAY. Treat, C.L. Tracy, W.F.; Drolsom, P.N.; Coors, J.G. Madison, Wis. : Crop Science Society of America. Resistant genotypes are the best means of control for Goss's wilt (*Corynebacterium michiganense ssp. nebrascense* Schuster, Hoff, Mandel, and Lazar) of maize (*Zea mays L.*). The purpose of this study was to identify susceptible and resistant genotypes and to determine the inheritance of resistance to Goss's wilt using generation means analysis and diallel experiments. Thirty-nine inbred lines were screened for resistance to Goss's wilt. Sixteen were susceptible, 15 intermediate, and 8 resistant. Four experiments, two generation mean analyses (GMA), and two diallels were used to investigate the inheritance of Goss's wilt. One GMA experiment consisted of the resistant inbred Mo17Ht, the susceptible inbred A634Ht, the F1, F2, and the F1 backcrossed to both parents. A second GMA experiment involved resistant Mo17Ht, susceptible CM105, the F1, F2, and the F1 backcrossed to both parents. One diallel had five parents and one six. Additive gene action was important in the generation mean analyses for resistance to Goss's wilt. Year effects and the generations X years interaction were highly significant. In the diallel experiments, general combining ability was highly significant for both, demonstrating the importance of additive gene effects. General combining ability and specific combining ability sums of squares accounted for 97.7 and 2.3% of the variation among crosses, respectively, in the first diallel, and for 91.0 and 9.0% in the second diallel. The results suggest that recurrent selection should be effective among the maize lines tested for resistance to Goss's wilt in maize. Crop science. July/Aug 1990. v. 30 (4). p. 893-896. Includes references. (NAL Call No.: DNAL 64.8 C883).

0937

**Lack of correlation of in vitro antibiosis with antagonism of ice nucleation active bacteria on leaf surfaces by non-ice nucleation active bacteria.**

PHYTAJ. Lindow, S.E. St. Paul, Minn. : American Phytopathological Society. Phytopathology. Literature review. Apr 1988. v. 78 (4). p. 444-450. Includes references. (NAL Call No.: DNAL 464.8 P56).

(PLANT DISEASES - BACTERIAL)

0938

**Mycoplasma diseases of corn in Florida.**  
Tsai, J.H. New York : Springer-Verlag, c1988.  
**Mycoplasma diseases of crops : basic and applied aspects / Karl Maramorosch, S.P. Raychaudhuri, editors.** p. 317-325. ill. Includes references. (NAL Call No.: DNAL SB737.M93).

No.: DNAL 448.3 J82).

0939

**Nonradioactive screening method for isolation of disease-specific probes to diagnose plant diseases caused by mycoplasmalike organisms.**  
APMBA. Lee, I.M. Davis, R.E.; DeWitt, N.D. Washington, D.C. : American Society for Microbiology. DNA fragments of tomato big bud (BB) mycoplasmalike organism (MLD) in diseased periwinkle plants (*Catharanthus roseus* L.) were cloned to pSP6 plasmid vectors and amplified in *Escherichia coli* JM83. A nonradioactive method was developed and used to screen for MLD-specific recombinants. Cloned DNA probes were prepared by nick translation of the MLD recombinant plasmids by using biotinylated nucleotides. The probes all hybridized with nucleic acid from BB MLD-infected, but not healthy, plants. Results from dot hybridization analyses indicated that several MLDs, e.g., those of Italian tomato big bud, periwinkle little leaf, and clover phyllody, are closely related to BB MLD. The Maryland strain of aster yellows and maize bushy stunt MLDs are also related to BB MLD. Among the remaining MLDs used in this study, *Vinca virescens* and elm yellows MLDs may be very distantly related, if at all, to BB MLD. Potato witches' broom, clover proliferation, ash yellows, western X, and Canada X MLDs are distantly related to BB MLD. Southern hybridization analyses revealed that BB MLD contains extrachromosomal DNA that shares sequence homologies with extrachromosomal DNAs from aster yellows and periwinkle little leaf MLDs. Applied and environmental microbiology. May 1990. v. 56 (5). p. 1371-1475. ill. Includes references. (NAL Call No.: DNAL 448.3 AP5).

0942

**Seed transmission of *Clavibacter michiganense* subsp. *nebraskense* in corn.**  
PLDIDE. Biddle, J.A. McGee, D.C.; Braun, E.J. St. Paul, Minn. : American Phytopathological Society. Plant disease. Nov 1990. v. 74 (ii). p. 908-911. Includes references. (NAL Call No.: DNAL 1.9 P69P).

0943

**Summer 1991 to be the worst ever for flea beetles and Stewart's Wilt.**  
Gauthier, N.L. Storrs, Conn. : Coop. Ext. Serv., USDA, College of Agriculture & Natural Resources, Univ. of Conn. The Grower : vegetable and small fruit newsletter. Apr 1991. v. 91 (4). p. 1-2. (NAL Call No.: DNAL SB321.G85).

0944

**Variation in the pathogenicity and aggressiveness of strains of *Erwinia carotovora* subsp. *carotovora* isolated from different hosts.**  
PLDIDE. Smith, C. Bartz, J.A. St. Paul, Minn. : American Phytopathological Society. Plant disease. July 1990. v. 74 (7). p. 505-509. Includes references. (NAL Call No.: DNAL 1.9 P69P).

0945

**Yellow- and white-endosperm effects on Stewart's wilt of maize.**  
PHYTAJ. Kang, M.S. Zuber, M.S. St. Paul, Minn. : American Phytopathological Society. Phytopathology. July 1988. v. 78 (7). p. 909-911. Includes references. (NAL Call No.: DNAL 464.8 P56).

0940

**Rapid spread of maize dwarf mosaic.**  
HJHSA. Splittstoesser, W.E. Rest, E. B.; D'Arcy, C.J. Alexandria, Va. : American Society for Horticultural Science. HortScience. Mar 1990. v. 25 (3). p. 360. Includes references. (NAL Call No.: DNAL SB1.H6).

0941

**Scanning electron microscope studies of *Agrobacterium tumefaciens* attachment to *Zea mays*, *Gladiolus* sp., and *Triticum aestivum*.**  
JDAAAY. Graves, A.E. Goldman, S.L.; Banks, S.W.; Graves, A.C.F. Washington, D.C. : American Society for Microbiology. Journal of bacteriology. May 1988. v. 170 (5). p. 2395-2400. ill. Includes references. (NAL Call

# PLANT DISEASES - VIRAL

0946

**Association between karyotype and host plant in corn leaf aphid (Homoptera: Aphididae) in the northwestern United States.**

EVETEX. Blackman, R.L. Halbert, S.E.; Carroll, T.W. Lanham, Md. : Entomological Society of America. Samples of *Rhopalosiphum maidis* (Fitch) taken from corn in Idaho and Montana from 1985 to 1987 were karyotyped and found to be  $2n = 8$ , whereas those from barley and barnyard grass (*Echinochloa crus-galli* (L.) P. Beauv.) were  $2n = 10$ . Samples from wheat in Idaho in 1987 had a mixture of karyotypes ( $2n = 8, 9$ , and  $10$ ). The results indicate highly selective colonization of corn and barley by different genotypes of *R. maidis*, so it is unlikely that this aphid can carry barley yellow dwarf virus (BYDV) between these two crops. *E. crus-galli* may be an important reservoir host for BYDV isolates vectored by *R. maidis* to barley and winter wheat. Environmental entomology. June 1990. v. 19 (3). p. 609-611. Includes references. (NAL Call No.: DNAL QL461.E532).

0947

**Association of Rmd1, a gene conditioning reaction to maize dwarf mosaic virus, with genes conditioning endosperm color (y1) and type (su2) in maize.**

PHYTA. Roane, C.W. Tolin, S.A.; Aycock, H.S.; Donahue, P.J. St. Paul, Minn. : American Phytopathological Society. Factors in maize conditioning resistance to maize dwarf mosaic virus (MDMV) have been shown by others to occur on chromosome 6. Genes conditioning endosperm color (y1) and type (su2) also occur on chromosome 6. Therefore, maize inbred line B68, Oh7B, and Pa405 having Rmd1, and Va85 probably having Rmd1, a gene conditioning resistance to MDMV strain 'A' (MDMV-A), were crossed to the genetic marker stock I1176, having the y1 and su2 genes and which is susceptible to MDMV. The crosses were assumed to be of the genotype Rmd1 Rmd1 Y1Y1 Su2Su2 X rmd1rmd1y1ysu2su2. All characters are monogenic and completely dominant; thus, a 3:1 ratio was expected for each character in the F2. The expected ratios were not achieved; therefore, the data were analyzed by calculating chi-square values for pairs of characters from contingency tables. For the B68, Oh7B, and Pa405 crosses, chi squares for MDMV reaction and endosperm color (rmd1/y1) were the largest, indicating closest association of gene loci. Chi squares for reaction and endosperm type (rmd1/su2), were the smallest, indicating least association of loci. The chi squares for endosperm color and type (y1/su2) were intermediate. Thus, rmd1 is near the y1 locus and on the centromere side of it, since it is a greater distance from su2 than is y1. The cross Va85 X I1176 produced results inconsistent with other crosses. Phytopathology. Dec 1989. v. 79 (12). p. 1368-1372. Includes references. (NAL Call No.: DNAL 464.8 P56).

0948

**Characterization of maize chlorotic mottle virus.**

PHYTA. Lommel, S.A. Kendall, T.L.; Siu, N.F.; Nutter, R.C. St. Paul, Minn. : American Phytopathological Society. Maize chlorotic mottle virus (MCMV) is an icosahedral plant virus 30 nm in diameter, composed of a single 25-kDa capsid protein subunit and a 4.4-kb single-stranded, positive-sense genomic RNA. The genomic RNA is capped at the 5' terminus with m7GpppA, and no genome-linked protein was detected. MCMV infection produces two discrete double-stranded RNA species in infected maize plants, corresponding to single-stranded RNAs of 4.4 and 1.1 kb. The smaller double-stranded RNA corresponds to a 1.1-kb subgenomic messenger RNA that is homologous to the 3'-terminal region of MCMV genomic RNA and encodes the viral capsid protein. Virion RNA directs the synthesis of 110-, 50-, 44-, 41-, 32-, and 25-kDa polypeptides in a rabbit reticulocyte lysate in vitro translation system. Only the 25-kDa polypeptide is immunoprecipitated by MCMV capsid protein antiserum. The similarities between MCMV and carnioviruses in their amino acid sequences, genome organization, and gene expression strategies suggest that MCMV is evolutionarily related to the carnioviruses. However, MCMV contains an additional open reading frame, does not produce a second subgenomic RNA, and has no capsid protein amino acid sequence identity with the carnioviruses. Given these distinctions, we propose that MCMV should be considered the type member of a new plant virus group. Phytopathology. Aug 1991. v. 81 (8). p. 819-823. Includes references. (NAL Call No.: DNAL 464.8 P56).

0949

**Characterization of maize streak virus isolates using monoclonal and polyclonal antibodies and by transmission to a few hosts.**

PLDIDE. Peterschmitt, M. Reynaud, B.; Sommermeyer, G.; Baudin, P. St. Paul, Minn. : American Phytopathological Society. Plant disease. Jan 1991. v. 75 (1). p. 27-32. Includes references. (NAL Call No.: DNAL 1.9 P69P).

0950

**Cloning of the maize rough dwarf virus genome: molecular confirmation of the plant-reovirus classification scheme and identification of two large nonoverlapping coding domain within a single genomic segment.**

VIRLA. Marzachi, C. Boccardo, G.; Nuss, D.L. Duluth, Minn. : Academic Press. The segmented double-stranded RNA genome of maize rough dwarf virus, a plant-infecting reovirus of the genus Fijivirus, was cloned and partially characterized. Nucleotide sequence analysis of full-length cDNA clones corresponding to genomic segments S6, S7, and S8 revealed each segment to contain the conserved terminal

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oligonucleotide sequences (+) 5' AAGUUUUUUU-----UGUC 3' and adjacent, segment-specific, regions of inverted complementarity (inverted repeats), a structural motif previously reported for members of the genus Phytoreovirus. Genomic segment S6 was completely sequenced and found to consist of 2193 base pairs. Computer analysis indicated that the coding strand contained two large nonoverlapping open reading frames consisting of 363 and 310 codons and located in the 5'- and 3'-terminal domains, respectively. This was confirmed by cell-free translation studies with synthetic transcripts and denatured genomic RNA. However, only the product of the 5'-proximal open reading frame, a 40-kDa polypeptide, was efficiently expressed in vitro from the full-length S6 coding strand. This represents the first case in which a reovirus genomic segment was found to contain two large open reading frames in a nonoverlapping configuration, suggesting possible alternative strategies for regulation of gene expression by members of this genus. The combined results provide a molecular confirmation of the current classification scheme for plant-infecting reoviruses. Furthermore, the fact that the same terminal structural motif is conserved across genera provides additional evidence that these elements serve an important functional role during genome transcription or replication. *Virology*. Feb 1991. v. 180 (2). p. 518-526. Includes references. (NAL Call No.: DNAL 448.8 V81).

0951

**Complementary DNA cloning and hybridization analysis of maize stripe virus RNAs.**  
VIRLA. Falk, B.W. Klaassen, V.A.; Tsai, J.H. Duluth, Minn. : Academic Press. *Virology*. Nov 1989. v. 173 (1). p. 338-342. illl. Includes references. (NAL Call No.: DNAL 448.8 V81).

0952

**Detection and differentiation of maize dwarf mosaic virus, strains A and B, by use of different class immunoglobulins in a double-antibody sandwich enzyme-linked immunosorbent assay.**

PHYTAJ. Jones, F.E. Hill, J.H.; Durand, D.P. St. Paul, Minn. : American Phytopathological Society. *Phytopathology*. Aug 1988. v. 78 (8). p. 1118-1124. illl. Includes references. (NAL Call No.: DNAL 464.8 P56).

0953

**Detection of maize dwarf mosaic onset in northern Ohio.**

PHYTA. Louie, R. Knoke, J.K. St. Paul, Minn. : American Phytopathological Society. An ability to detect maize dwarf mosaic virus (MDMV) infections will help explain how MDM epidemics develop. Trap plant plots with and without diseased source plants, successive maize

plantings, and grass weeds in tile plots were used to monitor MDM onset in northern Ohio. This area is outside the natural distribution of johnsongrass (*Sorghum halepense*), the overwintering host of MDMV-A. The average incidence of MDM in trap plants increased from 44 to 52% as the number of source plants placed at a 0.6-m distance from the trap plants increased from 25 to 100 plants. At a constant level of 100 source plants, the average incidence of MDM decreased from 52 to 33% as the distance between source plants and trap plants increased from 0.6 to 4-9 m. The decrease in MDM incidence averaged -4.8%/m of the distance from source plants and averaged +0.5% MDM for each unit increase in source plants. Successive plantings at location 2 detected MDM onset 42 and 12 days earlier in 1986 and 1987, respectively, than did the trap plant plots without source plants. MDMV was not detected in 832 weed samples collected from the field or in the six grass weed hosts grown in tile plots. Aphid populations were monitored with yellow-pan water traps. *Rhopalosiphum maidis* was significantly related to MDM onset. Aphid migration, seed transmission, and infected weed host hypotheses were evaluated as initial sources of MDMV. The weed host hypothesis best explained MDM onsets in northern Ohio. *Phytopathology*. July 1991. v. 81 (7). p. 760-765. Includes references. (NAL Call No.: DNAL 464.8 P56).

0954

**Effect of host resistance on pathogenesis of maize dwarf mosaic virus.**

PHYTA. Law, M.D. Moyer, J.W.; Payne, G.A. St. Paul, Minn. : American Phytopathological Society. The pathogenesis of maize dwarf mosaic virus (MDMV-A) in maize was characterized in locally and systemically infected tissues of susceptible and resistant maize genotypes. Resistant genotypes used in this investigation had been classified by the absence of systemic symptom expression. Because some plants of the resistant genotype occasionally expressed systemic symptoms, we refer to the presence of symptoms as the susceptible phenotype and the absence of symptoms as the resistant phenotype. MDMV capsid protein was detected 2 days after inoculation in the inoculated leaf at the site of inoculation in both susceptible and resistant genotypes. Proximal invasion from the site of inoculation also was detected in both susceptible and resistant genotypes although invasion was delayed 6 days in the resistant genotypes. The resistant genotype, PB3187, expressed both susceptible and resistant phenotypes. When a leaf was inoculated before the emergence of the next three subsequent leaves, systemic symptoms were expressed (susceptible phenotype). However, when a leaf was inoculated after the emergence of the next three subsequent leaves, the resistant phenotype was expressed. Infectious virus was found within the inoculated leaf, within stalk tissue below the inoculated leaf, and in the roots of PB3187 plants expressing either the susceptible or resistant phenotype. Infectious virus was detected only in tissue above the inoculated leaf in PB3187 plants expressing the

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susceptible phenotype but not in equivalent leaves of plants expressing the resistant phenotype. This phenomenon of differential phenotype expression was not affected by plant age or temperature. We propose that the resistance mechanism expressed in PB3187 acts at a specific point of systemic virus transport, thereby limiting upward virus transport from the roots to young, developing leaves. *Phytopathology*. July 1989. v. 79 (7). p. 757-761. illl. Includes references. (NAL Call No.: DNAL 464.8 P56).

0955

**Effectiveness and residual effects of seven insecticides on *Dalbulus maidis* (Homoptera: Cicadellidae) and *Peregrinus maidis* (Homoptera: Delphacidae).**

JESCEP. Tsai, J.H. Steinberg, B.; Falk, B.W. Tifton, Ga. : Georgia Entomological Society. *Journal of entomological science*. Jan 1990. v. 25 (1). p. 106-111. Includes references. (NAL Call No.: DNAL QL461.G4).

0956

**Elite maize germplasm: reactions to maize dwarf mosaic and maize chlorotic dwarf viruses.**

CRPSAY. Louie, R. Knoke, J.K.; Findley, W.R. Madison, Wis. : Crop Science Society of America. Information developed on the reactions of elite maize germplasm to maize dwarf mosaic (MDMV) and maize chlorotic dwarf (MCDV) viruses should aid breeding for resistance to these pathogens. The reactions of 23 dent maize (*Zea mays L.*) inbreds (plus one synthetic) and 46 hybrids were evaluated in the field and greenhouse following artificial inoculation with MCDV and two strains (A and B) of MDMV. Infection, as determined by diagnostic symptoms, was higher in greenhouse than in field tests. Furthermore, most of the apparent resistance to MDMV-A in the field was not confirmed when inoculations were made on younger, more succulent plants in the greenhouse. Inbreds B68, Oh1EP, Pa11, Pa405, and the synthetic, Ohs2, were immune or highly resistant to MDMV-A and -B. Inbred B64 was only resistant to MDMV-B. No inbred was immune to MCDV, but Ga209, Oh7B, Pa11, Tx601, and Oh1EP had the lowest disease incidence in the field, whereas Pa11 and B68 were the most resistant in the greenhouse. Most of the 32 field-planted hybrids that were resistant to MDMV-A had A632, A634, B64 or B68 as one parent; for MDMV-B, only B64 or B68 germplasm conveyed effective resistance. Hybrids B64 X B68 and B68 X B64 were immune to MDMV-A and -B in both field and greenhouse tests. The best and poorest hybrid reactions to MCDV in the field were B68 X Mo17 and A632 X B73, respectively. The most resistant hybrid (Mo17 X B64) in the greenhouse had > 50% infected plants. Plant height and yield losses in inbreds and hybrids to MDMV were minimal whereas MCDV usually caused significant height (34% average) and yield reductions (72% average). The reactions of these elite sources of germplasm to MDMV and MCDV suggest that evaluations for virus

resistance in maize should include both field and greenhouse test environments. *Crop science*. Nov/Dec 1990. v. 30 (6). p. 1210-1215. Includes references. (NAL Call No.: DNAL 64.8 C883).

0957

**Epidemics of diseases in agronomic crops in north Florida, 1970-1989.**

Kucharek, T. S.I. : The Society. *Proceedings - Soil and Crop Science Society of Florida. Meeting held September 26-28, 1989, St. Petersburg Beach, Florida*. 1990. v. 49. p. 187-192. Includes references. (NAL Call No.: DNAL 56.9 S032).

0958

**Evidence for infectivity of maize chlorotic dwarf virus and for a helper component in its leafhopper transmission.**

PHYTAJ. Hunt, R.E. Nault, L.R.; Gingery, R.E. St. Paul, Minn. : American Phytopathological Society. *Phytopathology*. Apr 1988. v. 78 (4). p. 499-504. Includes references. (NAL Call No.: DNAL 464.8 P56).

0959

**Genetic basis of resistance in maize to five maize dwarf mosaic virus strains.**

CRPSAY. Louie, R. Findley, W.R.; Knoke, J.K.; McMullen, M.D. Madison, Wis. : Crop Science Society of America. Maize dwarf mosaic (MDM) is a widespread viral disease of maize (*Zea mays L.*) in the southern U.S. Corn Belt. An understanding of the genetics for resistance to maize dwarf mosaic virus (MDMV) will provide a rational basis for effective selection. Our objective was to determine the genetic basis of resistance in inbred Pa405 to Strains A, B, D, E, and F of MDMV by examining the association between host symptom responses, and chromosomal translocation and morphological or molecular markers. Twenty-six translocation markers and the morphological marker y1 were incorporated into inbred M14. Linkage relationships with molecular markers were determined by restriction fragment length polymorphism (RFLP) analysis, using molecular markers UMC85, BNL6.29, UMC59, and UMC21. The three approaches all indicated a gene or genes on either the short arm or the proximal region of the long arm (proximal to Y1) of Chromosome 6 in inbred Pa405 controlling resistance to all five strains of MDMV. *Crop science*. Jan/Feb 1991. v. 31 (1). p. 14-18. Includes references. (NAL Call No.: DNAL 64.8 C883).

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0960

**Genetics of reaction to maize dwarf mosaic virus strain A in several maize inbred lines.**  
PHYTA. Roane, C.W. Tolin, S.A.; Aycock, H.S. St. Paul, Minn. : American Phytopathological Society. Nine maize inbred lines resistant to maize dwarf mosaic virus strain A (MDMV-A) were studied in hybrid combinations for inheritance of reaction to MDMV-A in F1 and F2. Plants growing in a field free of natural inoculum were mechanically inoculated at the two- to four-leaf stage. Three to four weeks later they were scored as healthy or symptomatic in response to virus. This was done to detect early symptoms not always apparent after anthesis. After anthesis plants were scored again but on a scale of 1-7; 1 = no infection, and 7 = nearly completely mottled. Plants that had symptoms before but not after anthesis were scored 2. Resistant inbred line B68, Oh1EP, Oh7B, and Pa405 (the B68 group) behaved homogeneously for virus reactions as lines and the F1 of crosses with susceptible line Va50 produced only type 1 plants. In the F2, resistance was monogenic and completely dominant. Since no infected plants were observed in F2 of crosses of lines within the B68 group, resistance occurred at one locus. The symbol Rmd1 is suggested for this locus. The resistant inbred lines A239, Va53, Va85, and Va0M73 (the Va53 group) produced only type 1 plants, but in the F1 of crosses with Va50, produced some susceptible plants; however, in F2 all segregated monogenically. In the F2 of crosses within the Va53 group and between the Va53 and B68 groups, susceptible segregates appeared. However, since the Va53 group behaved variably in F1 combination with Va50 it could not be ascertained that genes of the Va53 group were allelic with or different from the resistance gene of the B68 group. Va35 is unstable as a line and produced inconclusive results; in the F2 of Va50 X Va35, a 1:1 ratio was obtained instead of the expected 3:1. Inconclusive results were also obtained in the crosses Va35 X Pa405 and Va35 X A239. *Phytopathology*. Dec 1989. v. 79 (12). p. 1364-1368. Includes references. (NAL Call No.: DNAL 464.8 P56).

0961

**Helper virus-dependent replication, nucleotide sequence and genome organization of the satellite virus of maize white line mosaic virus.**

VIRLA. Zhang, L. Zitter, T.A.; Palukaitis, P. Duluth, Minn. : Academic Press. Virus like particles (17 nm in diameter) associated with maize white line mosaic virus (MWLMV) were shown to be a satellite virus of MWLMV (SV-MWLMV) on the basis of the following properties: (1) The SV-MWLMV was dependent upon the presence of MWLMV for replication in maize, while the latter virus could replicate independently of the SV particles. (2) No nucleotide sequence homology was detected between the SV-MWLMV and MWLMV, using complementary DNA probes prepared to the two RNAs, in a Northern blot hybridization analysis. 3) The RNA of the SV-MWLMV translated

in vitro to produce a protein of the same Mr (24,000) as that found associated with the SV particles. This protein could be immunoprecipitated with an antiserum to the SV particles. And (4), there was no serological relationship between the coat proteins of MWLMV and the SV-MWLMV. The complete nucleotide sequence of the SV-MWLMV RNA (1168 nucleotides) was determined. The SV-MWLMV RNA contains a single open reading frame encoding a polypeptide of Mr 23,961. Computer analysis revealed no significant homology between SV-MWLMV RNA and any other viral or satellite RNAs. However, the putative SV-MWLMV capsid protein is predicted to share some structural features with the capsid protein of the satellite virus of panicum mosaic virus. *Virology*. Feb 1991. v. 180 (2). p. 467-473. Includes references. (NAL Call No.: DNAL 448.8 V81).

0962

**Identification of a gene for resistance to wheat streak mosaic virus in maize.**

PHYTA. McMullen, M.D. Louie, R. St. Paul, Minn. : American Phytopathological Society. Wheat streak mosaic virus (WSMV) induces generalized mosaic symptoms in selected maize inbreds. During 1988 and 1989, WSMV was detected in many lines in our maize nursery. WSMV symptoms were associated with the expression of the polymitotic (po) marker in a B73 genetic background. The polymitotic locus is on the short arm of maize chromosome 6. An isolate of WSMV (WSMV-W) from naturally infected plants was used to rub-inoculate greenhouse-grown maize plants segregating (po/po or po/+)-B73, and the symptom responses of these plants confirmed the presence of a gene linked to po that controlled resistance to WSMV. Restriction fragment length polymorphism (RFLP) analysis located this gene on either the short arm of chromosome 6 or on the long arm proximal to the RFLP marker locus UMC59. The symptom responses to inoculation with WSMV were also determined for F2 and backcross plants from crosses between the WSMV-resistant inbred Pa405 and the WSMV-susceptible inbred Oh28. The segregation ratios suggested the presence of multiple genes for resistance to WSMV in Pa405. RFLP analysis of plants from these crosses demonstrated that one gene for resistance in Pa405 was also located on chromosome 6. *Phytopathology*. June 1991. v. 81 (6). p. 624-627. Includes references. (NAL Call No.: DNAL 464.8 P56).

0963

**Identification of the maize chlorotic mottle virus capsid protein cistron and characterization of its subgenomic messenger RNA.**

VIRLA. Lommel, S.A. Kendall, T.L.; Xiong, Z.; Nutter, R.C. Duluth, Minn. : Academic Press. Maize chlorotic mottle virus (MCMV) is a 30-nm icosahedral plant virus composed of a single 25-kDa capsid protein component and a 4.4-kb single-stranded, positive-sense genomic RNA. Northern blot hybridization analysis detected a

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single 3'-terminal 1.1-kb subgenomic RNA in infected plants. Virion RNA directs the synthesis of several polypeptides in a rabbit reticulocyte lysate in vitro translation system of which only the 25-kDa polypeptide is immunoprecipitated by MCMV capsid protein antiserum. The 1.1-kb subgenomic RNA is a highly efficient messenger RNA for capsid protein synthesis. Positive polarity in vitro transcripts from 3'-proximal MCMV cDNA clones direct the synthesis of the capsid protein in in vitro translation experiments. These data suggest that the MCMV capsid protein is expressed from a subgenomic RNA in vivo, and that the 25-kDa capsid protein is encoded by the 3'-proximal open reading frame in the MCMV genome. *Virology*. Mar 1991. v. 181 (1). p. 382-385. ill. Includes references. (NAL Call No.: DNAL 448.8 V81).

0964

**Influence of life history of grasses and maize chlorotic dwarf virus on the biotic potential of the leafhopper *Graminella nigrifrons* (Homoptera: Cicadellidae).**  
EVETEX. Hunt, R.E. Nault, L.R. Lanham, Md. : Entomological Society of America. Suitability of annual and perennial species of Sorghum, Lolium, and Panicum and of healthy or maize chlorotic dwarf virus (MCDV)-infected maize (*Zea mays* L.) was determined for oviposition and development of *Graminella nigrifrons* (Forbes). Intra- and intergeneric comparisons show that host life history and genus had a significant effect on the number of adult leafhoppers produced, their weight, and their developmental time from egg to adult, as did the interaction of these effects. More and heavier adults were produced on annual Sorghum and Panicum than on their perennial counterparts. Numbers and weights of leafhoppers produced on annual and perennial Lolium were not significantly different. Developmental time from egg to adult was shorter on annual than on perennial Panicum but was not different within Sorghum and Lolium. Numbers of adults and their weights on Sorghum species were greater than on Lolium species, which was greater than on Panicum species. Evidence that annual grasses may be superior to perennials as hosts within a genus for this generalist leafhopper is consistent with recent studies of natural grasslands that show higher leafhopper densities on annuals during the logarithmic phase of plant growth than at any time on perennials. Although healthy maize was an excellent host for *G. nigrifrons*, MCDV infection improved its suitability. This agrees with previous field (but not laboratory) studies that show young maize to be a suitable host for this leafhopper. Environmental entomology. Feb 1990. v. 19 (1). p. 76-84. Includes references. (NAL Call No.: DNAL QL461.E532).

0965

**Maize chlorotic dwarf and related viruses.**  
Gingery, R.E. New York : Plenum Press, c1988. Polyhedral virions with monopartite RNA genomes / edited by Renate Koenig. p. 259-272. Includes references. (NAL Call No.: DNAL QR357.P53 v.3).

0966

**Maize dwarf mosaic virus.**  
Jardine, D.J. Manhattan, Kan. : The Service. L - Cooperative Extension Service, Kansas State University. May 1988. (481,rev.). 4 p. ill. (NAL Call No.: DNAL 275.29 K13LE).

0967

**Maize necrotic lesion virus particles and associated cellular inclusions.**

EMSPA. Bradfute, O.E. Louie, R. San Francisco, Calif. : San Francisco Press, Inc. Proceedings ... annual meeting, Electron Microscopy Society of America. 1988. (46). p. 296-297. ill. Includes references. (NAL Call No.: DNAL QH201.E4).

0968

**Maize white line mosaic virus double-stranded RNA, replicative structure, and in vitro translation product analysis.**

PHYTA. Zhang, L. Zitter, T.A.; Palukaitis, P. St. Paul, Minn. : American Phytopathological Society. The possible involvement of subgenomic RNAs in maize white line mosaic virus (MWLMV) replication was investigated. In addition to full-length genomic double-stranded (ds) RNA, dsRNA with a "subgenomic" size (2.0 kb) was detected in extracts from MWLMV-infected corn plants. The viral RNA structures synthesized in vitro by a partially purified enzyme complex from MWLMV-infected corn leaves were similar to MWLMV replicative form (RF) and replicative intermediate form in electrophoretic behavior and ribonuclease sensitivity. Two major RFs (4.2 and 2.0 kb) and two minor RFs (1.2 and 0.8 kb) were found. The two major RFs corresponded to the two major dsRNAs found in MWLMV-infected corn plant extract. In vitro translation studies showed that MWLMV RNA directed the synthesis of four major polypeptides (26, 34, 35, ad 50 kDa). The 34- and 35-kDa polypeptides reacted weakly with antiserum specific to the MWLMV virion. This result and those from wester-blot analysis showed that the 35-kDa translation product was the MWLMV capsid protein. A model for MWLMV genome organization is proposed based on the comparison of features of MWLMV and the well characterized viruses carnation mottle, turnip crinkle, cucumber necrosis, and maize chlorotic mottle. *Phytopathology*. Oct 1991. v. 81 (10). p. 1253-1257. Includes references. (NAL Call No.: DNAL 464.8 P56).

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0969

### Molecular genetics of maize streak virus.

Lazarowitz, S.G. Pinder, A.J. New York, N.Y. : Alan R. Liss. UCLA symposia on molecular and cellular biology. In the series analytic: Molecular Biology of Plant-Pathogen Interactions. Meeting held Mar 26-Apr 1, 1988, Steamboat Springs, Colorado. 1989. v. 101. p. 167-183. illl. Includes references. (NAL Call No.: DNAL QH506.U34).

0970

### Overwintering of the leafhopper *Graminella nigrifrons* (Homoptera: Cicadellidae) in northern Ohio.

OJSCA. Anderson, R.J. Louie, R.; Knoke, J.K. Columbus, Ohio : Ohio Academy of Science. Ohio journal of science. Sept 1991. v. 91 (4). p. 159-162. Includes references. (NAL Call No.: DNAL 410 OH3).

0971

### Performance of corn hybrids grown in a virus disease environment.

TFHSA. West, D.R. Kincer, D.R.; Graves, C.R.; Reddick, B.B. Knoxville, Tenn. : The Station. Tennessee farm and home science : progress report - Tennessee Agricultural Experiment Station. Summer 1988. (147). p. 20-23. illl. Includes references. (NAL Call No.: DNAL 100 T25F).

0972

### Phylogenetic relatedness of maize chlorotic dwarf virus leafhopper vectors.

PHYTAJ. Nault, L.R. Madden, L.V. St. Paul, Minn. : American Phytopathological Society. Twenty-five leafhopper (Cicadellidae) species from 13 genera representing three tribes (Deltocephalini, Euscelini, and Macrosteolini) in the subfamily Deltocephalinae were tested as vectors of the semipersistently transmitted maize chlorotic dwarf virus (MCDV). Vectors and their estimated percent transmission by single insects when maize served as the virus source and inoculation test plant were: *Graminella nigrifrons*, 35.9%; *Amblysellus gress*, 24.8%; *Stirellus bicolor*, 13.7%; *Planicephalus flavocostatus*, 12.9%; *Exitianus exitiosus*, 12.6%; *G. sonora*, 10.5%; *Macrosteles severini*, 1.9%; and *Endria inimica*, 1.5%. Leafhopper species that did not transmit MCDV from maize to maize were *Baldulus tripsaci*, *Cicadulina mbila*, nine *Dalbulus* species, *Euscelidius variegatus*, *G. fitchii*, *G. aquaka*, *M. fascifrons*, *Ollarianus strictus*, and *Psammotettix lividellus*. When johnsongrass rather than maize was used as a virus source and test plant, *G. aquaka* transmitted MCDV. When the relationship between transmission rate of MCDV by a leafhopper species and its phylogenetic (evolutionary) relatedness to *G. nigrifrons* (the principal field vector) was evaluated by Kendall's tau correlation

analysis, there was a significant positive relationship for phylogeny with one ( $P$  less than 0.05), but not a second ( $P$  greater than 0.10) proposed phylogeny, when all leafhopper species used in this study were considered. When grass-specializing leafhoppers whose developmental hosts that do not include maize were excluded from the analysis, both phylogenies were significantly correlated ( $P$  less than 0.01) with MCDV transmission. From this study, it can be predicted that leafhopper species from the tribes Deltocephalini or recent (advanced) Euscelini that use maize as a feeding and breeding host have a high probability of being MCDV vectors, whereas leafhoppers from those taxa that do not feed well on maize or those from the primitive Euscelini or Macrosteolini, even if maize is a preferred host, have a low  $P$ . *Phytopathology*. Dec 1988. v. 78 (12.pt.2). p. 1683-1687. Includes references. (NAL Call No.: DNAL 464.8 P56).

0973

### Plant DNA viruses.

Mandahar, C.L. Boca Raton, Fla. : CRC Press, 1989. Plant viruses / editor, C.L. Mandahar. v. 1 p. 235-258. Includes references. (NAL Call No.: DNAL QR351.P58).

0974

### Population dynamics of *Rhopalosiphum padi* (Homoptera: Aphididae) in corn in relation to barley yellow dwarf epidemiology in southwestern Idaho.

EVETEX. Blackmer, J.L. Bishop, G.W. Lanham, Md. : Entomological Society of America. Population dynamics of *Rhopalosiphum padi* (L.) in seed and silage corn were investigated from 1981 through 1985 in southwestern Idaho. Aphid population development was divided into four phases: an immigration period, a lag period, a period of rapid increase where aphid numbers reached several million per hectare, and an emigration period characterized by an increase in alataoid nymphs and alatae. Just before peak aphid densities occurred, prereproductive development time for apterous *R. padi* was  $9.9 \pm 0.9$  d (average  $\pm$  SEM) in seed corn and  $9.6 \pm 0.5$  d in silage corn. The reproductive rate of apterae during this same period was  $36.6 \pm 11.0$  nymphs in seed corn and  $9.8 \pm 2.9$  nymphs in silage corn. Flight activity, as indicated by suction trap data, peaked in July and again from September through October or November. These two peaks corresponded with the immigration and emigration of *R. padi* detected in corn. Residents on corn were assayed for transmission of barley yellow dwarf virus, and the mean frequencies were 36% in 1983, 4% in 1984, and 2% in 1985. Migrant *R. padi* collected in a modified suction trap in 1985 showed a mean transmission frequency of 6%. Fall migrant *R. padi* in corn had a mean life span of approximately 14 d and a maximum life span of 41 d, which is sufficient time for fall-planted cereals to become infested with these migrants. Monthly maximum and minimum temperatures for

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epidemic and nonepidemic years differed most in December, January, and February, suggesting a possible temperature-disease relationship. Environmental entomology. Feb 1991. v. 20 (i). p. 166-173. Includes references. (NAL Call No.: DNAL QL461.E532).

0975

**Rapid identification of maize stripe virus.**  
PHYTA. Bradfute, O.E. Tsai, J.H. St. Paul, Minn. : American Phytopathological Society. Maize stripe virus (MStpV) was identified in maize leaves by either diagnostic symptoms or needle-shaped crystals. The symptoms consisted of chlorotic patterns of overlapping circles with distinct margins when magnified 3-10X. The crystals were found in abundance by phase-contrast light microscopy in sap from symptomatic leaf areas. The crystals were similar to crystals of MStpV noncapsid protein in appearance and in differential solubility and reacted with antiserum to MStpV noncapsid protein in immunofluorescence microscopy. Diagnostic symptoms and the crystals could be found readily in naturally and experimentally MStpV-infected maize plants with a wide range of gross symptom types and throughout disease development, but not in maize infected by other maize viruses, or mycoplasmas, or in maize with sorghum downy mildew. The crystals were found in MStpV-infected sorghum, itchgrass, and two species of annual teosinte. By the presence of diagnostic symptoms and the crystals in leaf samples, the distribution of MStpV or a similar virus in maize was confirmed in Botswana, Mauritius, Nigeria, Peru, and Venezuela, where MStpV has been reported previously, and extended to Argentina, Brazil, and Puerto Rico. Similar needle-shaped crystals were found in maize leaves infected with rice stripe virus, confirming the similarity of this virus to MStpV and suggesting that direct observation of needle-shaped crystals may also indicate the presence of other viruses in the rice stripe virus group. Phytopathology. Aug 1990. v. 80 (8). p. 715-719. ill. Includes references. (NAL Call No.: DNAL 464.8 P56).

0976

**Registration of KyWVS and KyYVS maize germplasm.**  
CRPSAY. Poneleit, C.G. Evans, K.O.; Loeffel, F.A. Madison, Wis. : Crop Science Society of America. Crop science. May/June 1990. v. 30 (3). p. 756-757. Includes references. (NAL Call No.: DNAL 64.8 C883).

0977

**Registration of PA356, PA376 and PA891 parental lines of maize.**  
CRPSAY. Johnson, M.W. Madison, Wis. : Crop Science Society of America. Crop science. Sept/Oct 1989. v. 29 (5). p. 1333-1334. (NAL Call No.: DNAL 64.8 C883).

0978

**Registration of RTx2858 MDMV-A resistant germplasm.**  
CRPSAY. Miller, F.R. Toler, R.W. Madison, Wis. : Crop Science Society of America. Crop science. May/June 1990. v. 30 (3). p. 764. Includes references. (NAL Call No.: DNAL 64.8 C883).

0979

**The rice stripe virus group.**  
Gingery, R.E. New York : Plenum Press, c1988. The Filamentous plant viruses / edited by R.G. Milne. Literature review. v. 4 p. 297-329. ill. Includes references. (NAL Call No.: DNAL QR357.P53 v.4).

0980

**Seed transmission of maize chlorotic mottle virus.**  
PLDIDE. Jensen, S.G. Wysong, D.S.; Ball, E.M.; Higley, P.M. St. Paul, Minn. : American Phytopathological Society. Plant disease. May 1991. v. 75 (5). p. 497-498. Includes references. (NAL Call No.: DNAL 1.9 P69P).

0981

**Severe maize chlorotic dwarf disease caused by double infection with mild virus strains.**  
PHYTA. Gingery, R.E. Nault, L.R. St. Paul, Minn. : American Phytopathological Society. Severe symptoms thought to be caused by maize chlorotic dwarf virus (MCDV) in the field have not been consistently reproduced by isolates of the virus in the greenhouse. To determine if severe symptoms could be caused by multiple infections of mild MCDV strains, six MCDV isolates causing mild symptoms were separated from naturally infected johnsongrass (*Sorghum halepense*), the overwintering host, and then coinoculated into corn (*Zea mays*) in various combinations. One of the isolates, MCDV-M1, caused mild symptoms by itself, but severe symptoms in combination with any of the other mild isolates or the type strain. MCDV-M1 was serologically related to but distinct from the other isolates and the type strain, and two of the three capsid proteins from MCDV-M1 were larger than those of the other isolates and type strain. The other isolates were all indistinguishable from the type strain. Virus isolated from plants with severe symptoms after double inoculation with MCDV-M1 and another of the isolates gave a capsid protein pattern expected for a combination of both viruses. We conclude that MCDV-M1 is a strain of MCDV and that severe symptoms resulted from a synergistic effect involving MCDV-M1 and one of the other isolates. In a field survey, seven of 11 severely diseased corn plants and seven of 10 johnsongrass plants were doubly infected with MCDV-M1 and the type strain. Phytopathology. Aug 1990. v. 80 (8). p. 687-691. ill. Includes references. (NAL Call

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No.: DNAL 464.8 P56).

0982

### Spread of maize chlorotic dwarf virus in maize fields by its leafhopper vector, *Graminella nigrifrons*.

PHYTA. Madden, L.V. Knoke, J.K.; Louie, R. St. Paul, Minn. : American Phytopathological Society. Adult leafhoppers of *Graminella nigrifrons*, given a 2-day acquisition access period to maize chlorotic dwarf virus (MCDV), were released in the center of maize plots planted in early May (1985 and 1986) or in late June to early July (1984-1986). Disease incidence ( $y$ ) was assessed at least twice after insect release and represented as the proportion of plants infected by MCDV in successive 80-cm wide annuli from the source. Disease gradients were best described by the log-logistic model, i.e., logit of  $y$  versus  $\ln(\text{distance})$  was a straight line. The model indicated that the rate of spread was proportional to  $y$ ,  $1 - y$ , and  $1/\text{distance}$ . The spread parameter ( $b$ ), a measure of the gradient steepness and slope of the linearized model, ranged from 1.3 for the early planting in 1985 to 2.0 for the late planting in 1984. In 1984 and the early plantings of 1985 and 1986, there was little change in  $b$  over time. In the late plantings, however,  $b$  increased (indicating steeper gradients) between 14 and 21 days after release. At approximately 21 days after release, the distance at which  $y$  declined to 0.10 (10%) ranged from 124 to 525 cm. The rates of increase in  $y$  over time for the entire plots and at selected distances from the release point were measured using the apparent infection rate ( $r$ ). There was no discernible effect of distance from the source on  $r$ . The  $r$  parameter consistently declined over time. Results indicate that MCDV spread can be substantial when viruliferous leafhoppers are introduced into a field of susceptible maize. *Phytopathology*. Mar 1990. v. 80 (3). p. 291-298. Includes references. (NAL Call No.: DNAL 464.8 P56).

0983

### Tubular helical structures and fine filaments associated with the leafhopper-borne maize yellow stripe virus.

PHYTA. Ammar, E.D. Gingery, R.E.; Gordon, D.T.; Aboul-Ata, A.E. St. Paul, Minn. : American Phytopathological Society. A new disease agent, designated maize yellow stripe virus (MYSV) and transmitted in a persistent manner by the leafhopper *Cicadulina chinai*, is associated with three types of symptoms on infected plants: fine stripe, coarse stripe, and chlorotic stunt. Light and electron microscopy of naturally or experimentally infected maize or sorghum leaves showing any of these three symptoms revealed the presence of large, amorphous, intracytoplasmic inclusions in phloem elements, vascular parenchyma, bundle sheath, and mesophyll cells. These inclusions contained masses of long, flexuous, tubular structures, approximately 34 nm in diameter,

apparently composed of helically wound filaments 5-7 nm thick. These structures commonly were associated with or sandwiched between aggregated mitochondria, some of which were degenerated. Some of the cells containing tubular structures also contained masses of loosely or densely packed fine fibrils. Purified preparations obtained from naturally infected leaves had typical nucleoprotein ultraviolet absorbance spectra and contained fine filaments 4-8 nm in diameter. Crystallized, apparently nonvirion protein also was purified from these leaves and was serologically unrelated to the noncapsid protein of maize stripe virus (MStV). Crude extracts from infected leaves did not react with antisera to the capsid protein of MStV or to several other maize viruses and spiroplasma in enzyme-linked immunosorbent assay. Similarities and differences between MYSV and tenuiviruses (rice stripe virus group) are discussed. *Phytopathology*. Mar 1990. v. 80 (3). p. 303-309. illl. Includes references. (NAL Call No.: DNAL 464.8 P56).

0984

### Yield losses caused by maize dwarf mosaic virus in maize.

CRPSAY. Scott, G.E. Darrah, L.L.; Wallin, J.R.; West, D.R.; Knoke, J.K.; Louie, R.; Gudauskas, R.T.; Bockholt, A.J.; Damsteegt, V.D.; Uyemoto, J.K. Madison, Wis. : Crop Science Society of America. Maize dwarf mosaic (MDM) is a virus disease of maize (*Zea mays L.*) that causes yield reductions. The objective of this study was to determine yield losses caused by maize dwarf mosaic virus strain A (MDMV-A) in susceptible maize hybrids grown over a wide range of environmental conditions. Plants inoculated with MDMV-A were compared with noninoculated plants in the years 1981 to 1984 at various locations within the USA. Inoculation levels were 100% in 1981; 33, 67, and 100% in 1982; and 50 and 100% of the plants in 1983 and 1984. The regressions of grain yields (expressed as a percentage of the noninoculated check) on MDM-diseased plants were calculated. Linear regressions best explained the results, and deviations from linearity were not statistically significant. The  $b$  values ranged from 0.118 to 0.445 for different location and year combinations. The linear regression that best described the results over all environments and hybrids was  $Y = 99.7 - 0.242x$  where  $Y$  = predicted yield (as a percentage of the noninoculated check) and  $x$  = percentage of diseased plants. Thus, maize dwarf mosaic virus decreased yields by an average of 2.4% for each 10% increase in MDM-diseased plants. This certainly emphasizes the need to grow hybrids that are resistant to this virus. *Crop science*. July/Aug 1988. v. 28 (4). p. 691-694. Includes references. (NAL Call No.: DNAL 64.8 C883).

# PLANT DISEASES - PHYSIOLOGICAL

0985

## Alfalfa autotoxic fraction characterization and initial separation.

CRPSAY. Hall, M.H. Henderlong, P.R. Madison, Wis. : Crop Science Society of America. Alfalfa (*Medicago sativa L.*) has been reported as having autotoxic or autoallelopathic characteristics, but the plant fraction containing the autotoxic material and the responsible compound have not been isolated or identified. Greenhouse and laboratory studies were conducted to: (i) determine if 'Vanguard' alfalfa exhibits autotoxicity, (ii) determine which plant fraction contains the autotoxic material, and (iii) separate the autotoxic fraction using paper chromatography procedures. In greenhouse studies, alfalfa plant material reduced alfalfa emergence by an average of 87 and 62% in a Kokomo silty loam soil (fine, mixed mesic, Typic Argiaquoll) previously cropped with alfalfa and corn (*Zea mays L.*), respectively. Incubating the soil and plant material under two contrasting moisture regimes did not alter the inhibitory activity. However, autoclaving the soil and plant material negated the autotoxic response. Laboratory studies indicate that the autotoxic compound was contained within the water-extractable alfalfa fraction, and was not the direct result of microbial activity, although microbial activity may increase the dissipation of the compound. Ascending paper chromatographic separation indicated that the autotoxic compound had an R<sub>f</sub> characterization similar to phenolic acid; however, phenolic-absorbent polyvinylpoly-pryrrolidone did not affect the autotoxic response. The results indicate that alfalfa contains a water-soluble autotoxic compound that has characteristics indicative of a phenolic compound. *Crop science*. Mar/Apr. 1989. v. 29 (2). p. 425-428. Includes references. (NAL Call No.: DNAL 64.8 C883).

0986

Boron effect on mineral nutrients of maize. AGJOAT. Mozafar, A. Madison, Wis. : American Society of Agronomy. Boron deficiency affects the uptake of several elements by plants. Information on the effect of B on yield and nutrient uptake by maize (*Zea mays L.*) is limited. This sand-culture study was conducted to acquire information on the long-term effects of B and interruption of its supply on yield, and the concentrations of 12 elements in earleaf and root of two maize hybrids, Mutin and Carlos Semu 201 (CS 201). Hybrids differed significantly in the concentrations of 11 elements in the earleaves and eight elements in the roots. Increase in solution B concentration increased the concentration of B in the earleaf and root and changed the concentrations of N, P, Mn, Fe, Zn and Mo in the earleaf and Ca, Mg, Mn, Fe, Zn, Cu, and Mo in the root. Interruption of B supply from tasseling to maturity significantly reduced ear and total yield, decreased B concentration, and altered the concentrations of several other elements in earleaf and root. Significant interactions between B concentrations and interruption of B supply, and hybrids with yield and

concentrations of several earleaf and root nutrients were observed. Earleaf concentrations of N, K, Ca, Mg, Na, Cu, Mn, and Mo in Mutin, and K, Ca, Cu, and Mo in CS 201 showed significant correlation with earleaf B. Root concentrations of Ca, Fe, and Na in Mutin and Ca, Fe, Mn, and Mo in CS 201 showed correlation with root B. These observations indicate that B, depending on its concentration in the rooting medium, the element under study, and the hybrid, may change the uptake and transport of several other elements in maize. This effect of B, presumed to be due to changes in the membrane transport properties, supports similar findings in other plants. The relationships between the concentrations of K, Ca, Cu, and Mo with the B in the earleaves of both maize hybrids, if proved to hold true under field conditions, indicate that in studies on the uptake of these elements by maize the availability of B in the growth substrate needs also t. *Agronomy journal*. Mar/Apr 1989. v. 81 (2). p. 285-290. Includes references. (NAL Call No.: DNAL 4 AM34P).

0987

## Carbon--a plant nutrient, deficiency and sufficiency.

JPNUDS. Schwarz, N. Strain, B.R. New York, N.Y. : Marcel Dekker. *Journal of plant nutrition*. 1990. v. 13 (9). p. 1073-1078. (NAL Call No.: DNAL QK867.J67).

0988

## Development of tools for evaluating herbicide injury to corn /by James R. Smart.

Smart, James R. 1991. Thesis (Ph.D.)--University of Nebraska--Lincoln, 1991. viii, 122 leaves : ill. ; 28 cm. Includes bibliographical references. (NAL Call No.: NBU LD3656.5 1991 S637).

0989

## Effects of aliphatic acids on seed germination and seedling growth in soil.

CSOSA2. Krogmeier, M.J. Bremner, J.M. New York, N.Y. : Marcel Dekker. *Communications in soil science and plant analysis*. 1990. v. 21 (7/8). p. 547-555. Includes references. (NAL Call No.: DNAL S590.C63).

0990

## Effects of excessive magnesium in irrigation waters on wheat and corn growth.

CSOSA2. Franklin, W.T. Olsen, J.S.; Soltanpour, P.N. New York, N.Y. : Marcel Dekker. *Communications in soil science and plant analysis*. 1991. v. 22 (1/2). p. 49-61. Includes references. (NAL Call No.: DNAL S590.C63).

## (PLANT DISEASES - PHYSIOLOGICAL)

0991

**Effects of pH and aluminum and manganese toxicity on mycorrhizal associations with sorghum and maize /by Carlos Alberto Barbosa Medeiros.**

Medeiros, Carlos Alberto Barbosa. 1991. Thesis (Ph.D.)--University of Nebraska--Lincoln, 1991. xii, 230 leaves : ill. ; 28 cm. Includes bibliographical references. (NAL Call No.: NBU LD3656.5 1991 M434).

0992

**Effects of the onespotted stink bug (Hemiptera: Pentatomidae) on growth and yield of corn.**

JEENAI. Annan, I.B. Bergman, M.K. College Park, Md. : Entomological Society of America. Journal of economic entomology. Apr 1988. v. 81 (2). p. 649-653. Includes references. (NAL Call No.: DNAL 421 J822).

0993

**Iron deficiency stress response of various C-3 and C-4 grain crop genotypes: strategy II mechanism evaluated.**

JPNUDS. Lytle, C.M. Jolley, V.D. New York, N.Y. : Marcel Dekker. The relative amount of phytosiderophore produced by various Strategy II plants has been categorized as follows: barley (*Hordeum vulgare* L.) > wheat (*Triticum aestivum* L.) > oat (*Avena byzantina* C. Koch.) > rye (*Secale cereale* L.) much greater than corn (*Zea mays* L.) much greater than sorghum (*Sorghum bicolor* (L.) Moench) > rice (*Oryza sativa* L.). With the exception of rice, these plants developed under oxidized soil conditions, and the C-3 species produce more phytosiderophore than C-4 species under Fe-deficiency stress. Iron-efficient Coker 227 oat produced phytosiderophore in response to Fe-deficiency stress, while Fe-inefficient TAM O-312 oat did not. Although Fe-efficient WF9 corn and Fe-inefficient ys1 corn differed in their ability to obtain Fe, neither produced sufficient quantities of phytosiderophore to explain these differences. The objectives of this research were to determine: (a) if phytosiderophore production of Fe-deficiency stressed C-4 species millet (*Panicum miliaceum* L.) and corn is low or absent compared to identically stressed C-3 species oat and barley, and (b) if native, inbred and hybrid corn cultivars differ in ability to produce and utilize phytosiderophores. Although release of phytosiderophore for Fe-stressed corn and millet was generally lower than oat, quantity of release was not always related to obtaining Fe and maintaining green plants. Barley maintained high leaf Fe and low chlorosis with a minor release of phytosiderophore. Oat with increased release acted similarly to barley, whereas a relatively high release of phytosiderophore from White maize did not effect Fe uptake or greening. Likewise, small amounts of phytosiderophore were produced by all corn types, but corn was generally unable to obtain adequate Fe from the growth medium. Two of the native corns, Coneso and Tepecintle,

maintained relatively low chlorosis, but they differed in phytosiderophore release. Thus, it appears that the C-4 plants studied herein generally release. Journal of plant nutrition. 1991. v. 14 (4). p. 341-361. Includes references. (NAL Call No.: DNAL QK867.J67).

0994

**Plants can utilize iron from Fe-N,N'-DI-(2-hydroxybenzoyl)-ethylenediamine--N,N'-diacetic acid, a ferric chelate with 10(6) greater formation constant than Fe-EDDHA.**

JPNUDS. Chaney, R.L. New York, N.Y. : Marcel Dekker. Journal of plant nutrition. Paper presented at the "Fourth International Symposium on Iron Nutrition and Interactions in Plants," July 6-9, 1987, University of New Mexico, Albuquerque. June/Nov 1988. v. 11 (6/11). p. 1033-1050. ill. Includes references. (NAL Call No.: DNAL QK867.J67).

0995

**Purple corn often phosphorus deficient.**

Gerwing, J. Brookings, S.D. : The Department. Field facts : soils, insects, diseases, weeds, crops - South Dakota State University, Cooperative Extension Service, Plant Science Department. June 3, 1988. v. 3 (11). p. 1. (NAL Call No.: DNAL S596.7.F44).

0996

**Response of ammonium assimilation enzymes to nitrogen form treatments in different plant species.**

JPNUDS. Magalhaes, J.R. Huber, D.M. New York, N.Y. : Marcel Dekker. This series of experiments studied N metabolism in tomato, rice and corn. Ammonium (NH<sub>4</sub><sup>+</sup>), as a sole source of N, reduced tomato and corn growth, but not rice growth. Tomato showed the most severe NH<sub>4</sub><sup>+</sup> toxicity. Ammonium assimilation enzyme activity differed greatly among the species. Rice had much higher glutamine synthetase (GS) activity than corn and tomato with NH<sub>4</sub><sup>+</sup> nutrition. GS activity was especially high in shoot tissue. Ammonium induced high activity of glutamate dehydrogenase (GDH) in roots of tomato but not in rice. GS activity in rice increased as the level of NH<sub>4</sub><sup>+</sup> increased; and it was higher in shoots than roots, indicating GS activity as a key factor in the detoxification and metabolism of NH<sub>4</sub><sup>+</sup> in green tissues of efficient plant species. Journal of plant nutrition. 1991. v. 14 (2). p. 175-185. Includes references. (NAL Call No.: DNAL QK867.J67).

0997

**Transient water stress in a vegetation canopy:  
simulations and measurements.**

RSEEA. Carlson, T.N. Belles, J.E.; Gillies,  
R.R. New York, N.Y. : Elsevier Science  
Publishing. Remote sensing of environment.  
Paper presented at the "Symposium on Remote  
Sensing for Agriculture," May 16-18, 1990,  
Beltsville, Maryland. Feb/Mar 1991. v. 35  
(2/3). p. 175-186. Includes references. (NAL  
Call No.: DNAL Q184.R4).

# MISCELLANEOUS PLANT DISORDERS

0998

## Adsorption and deactivation of norflurazon by activated charcoal.

WETEE9. Lamoreaux, R.J. Corbin, V.L.; Johl, B.S. Champaign, Ill. : The Society. Weed technology : a journal of the Weed Science Society of America. Apr/June 1989. v. 3 (2). p. 297-302. Includes references. (NAL Call No.: DNAL SB610.W39).

0999

## Antidotal effects of dichlormid and R-29148 on the herbicidal activity of chlorimuron and sulfometuron.

PNWSB. Zbiec, I.I. Devlin, R.M. College Park, Md. : The Society. Proceedings of the annual meeting - Northeastern Weed Science Society. 1990. v. 44. p. 6-10. Includes references. (NAL Call No.: DNAL 79.9 N814).

1000

## Carryover effect of new soybean herbicides on corn.

Witt, W.W. Mills, J.A.; Schmitz, G.L. Lexington, Ky. : The Department. Soil science news & views - Cooperative Extension Service and University of Kentucky, College of Agriculture, Department of Agronomy. Apr 1988. v. 9 (4). 2 p. (NAL Call No.: DNAL S591.55.K4S64).

1001

## Chlorimuron ethyl metabolism in corn.

PCPB. Lamoureux, G.L. Rusness, D.G.; Tanaka, F.S. Orlando, Fla. : Academic Press.

<sup>14</sup>C chlorimuron ethyl was readily absorbed by the roots of young intact corn seedlings and through the cut ends of excised leaves, but it was not readily absorbed by intact leaves. Under the conditions employed, <sup>14</sup>C chlorimuron ethyl was metabolized at a moderate rate in both intact roots and excised leaves (ca. 2.4 mmol/g fresh wt tissue/hr). Based upon high-performance liquid chromatography (HPLC) analysis, <sup>14</sup>C chlorimuron ethyl appeared to be metabolized by similar routes in both the roots and leaves. <sup>14</sup>C chlorimuron ethyl and 10 radioactive metabolites were detected in the roots of corn 7 hr following herbicide treatment. <sup>14</sup>C chlorimuron ethyl and seven metabolites, listed in approximate order of their abundance, were isolated and characterized: chlorimuron ethyl (N-(4-chloro-6-methoxypyrimidine-2-y1)-N'-(2-ethoxycarbonylbenzenesulfonyl)urea; (I)) N-(4-chloro-5-hydroxy-6-methoxypyrimidine-2-y1)-N'-(2-ethoxycarbonylbenzenesulfonyl)urea, (II) 2-ethoxycarbonylbenzene sulfonamide, (IV) N-(4-S-glutathionyl-6-methoxypyrimidine-2-y1)-N'-(2-ethoxycarbonylbenzenesulfonyl)urea, (VI) N-(4-S-glutathionyl-5-hydroxy-6-methoxypyrimidine-2-y1)-N'-(2-ethoxycarbonylbenzenesulfonyl)urea, (III)

N-(4-chloro-5-O-beta-D-glucosyl-6-methoxypyrimidine-2-y1)-N'-(2-ethoxycarbonylbenzenesulfonyl)urea, (VII) N-(4-chloro-6-methoxypyrimidine-2-y1)-N'-(2-ethoxy-?-O-beta-D-glucosyl benzenesulfonyl)urea, and (V)

N-(4-S-cysteinyl-6-methoxypyrimidine-2-y1)-N'-(2-ethoxycarbonylbenzenesulfonyl)urea. Chlorimuron ethyl and these metabolites were purified by HPLC and were characterized by fast atom bombardment mass spectrometry (FAB MS). In addition to FAB MS, the following methods were used in the characterization of some metabolites: synthesis, hydrolysis with beta-glucosidase, analysis of hydrolysis products, electron impact mass spectrometry, and proton nuclear magnetic resonance (400 MH). Pesticide biochemistry and physiology. Sept 1991. v. 41 (1). p. 66-81. Includes references. (NAL Call No.: DNAL SB951.P49).

1002

## A comparison of crop stress factors determined under controlled drainage and naturally fluctuating water table conditions.

Ahmad, N. Kanwar, R.S. St. Joseph, Mich. : The Society. American Society of Agricultural Engineers (Microfiche collection). Paper presented at the 1988 Winter Meeting of the American Society of Agricultural Engineers. Available for purchase from: The American Society of Agricultural Engineers, Order Dept., 2950 Niles Road, St. Joseph, Michigan 49085. Telephone the Order Dept. at (616) 429-0300 for information and prices. 1988. (fiche no. 88-2610). 21 p. Includes references. (NAL Call No.: DNAL FICHE S-72).

1003

Control of triazine-resistant smooth pigweed (*Amaranthus hybridus*) and common lambsquarters (*Chenopodium album*) in no-till corn (*Zea mays*). WETEE9. Hagood, E.S. Jr. Champaign, Ill. : The Society. Weed technology : a journal of the Weed Science Society of America. Jan/Mar 1989. v. 3 (1). p. 136-142. Includes references. (NAL Call No.: DNAL SB610.W39).

1004

## Cysteine, gamma-glutamylcysteine, and glutathione levels in maize seedlings. Distribution and translocation in normal and cadmium-exposed plants.

PLPFA. Rauser, W.E. Schupp, R.; Rennenberg, H. Rockville, Md. : American Society of Plant Physiologists. The levels of cysteine (Cys), gamma-glutamylcysteine (gamma EC), and glutathione (GSH) were measured in the endosperms, scutella, roots, and shoots of maize (*Zea mays L.*) seedlings. GSH was the major thiol in roots, shoots, and scutella. Cys predominated in endosperms. The endosperm, scutellum, and functional phloem translocation were required for maintenance of GSH pools in

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roots and shoots of 6-day-old seedlings. Exposure of roots to 3 micromolar Cd, besides causing a decline in GSH, caused an accumulation of gamma EC, as if the activity of GSH synthetase was reduced in vivo. 35S Cys injected into endosperms of seedlings was partly metabolized to 35S sulfate. The scutella absorbed both 35S sulfate and 35S Cys and transformed 68 to 87% of the radioactivity into 35S GSH. 35S GSH was translocated to roots and shoots in proportion to the tissue fresh weight. Taken together, the data supported the hypothesis that Cys from the endosperm is absorbed by the scutellum and used to synthesize GSH for transfer through the phloem to the root and shoot. The estimated flux of GSH to the roots was 35 to 60 nanomoles per gram per hour, which totally accounted for the small gain in GSH in roots between days 6 and 7. For Cd-treated roots the GSH influx was similar, yet the GSH pool did not recover to control levels within 24 hours. The estimated flux of GSH to the entire shoot was like that to the roots; however, it was low (11-13 nanomoles per gram per hour) to the first leaf and high (76-135 nanomoles per gram per hour) to the second and younger leaves. Plant physiology. Sept 1991. v. 97 (1). p. 128-138. Includes references. (NAL Call No.: DNAL 450 P692).

### 1005

#### Decreased ethylene biosynthesis, and induction of aerenchyma, by nitrogen- or phosphate-starvation in adventitious roots of *Zea mays* L.

PLPHA. Drew, M.C. He, C.J.; Morgan, P.W. Rockville, Md. : American Society of Plant Physiologists. Plants of *Zea mays* L. cv TX5855 were grown in a complete, well oxygenated nutrient solution then subjected to nutrient starvation by omitting either nitrate and ammonium or phosphate from the solution. These treatments induced the formation of aerenchyma close to the apex of the adventitious roots that subsequently emerged from the base of the shoot, a response similar to that shown earlier to be induced by hypoxia. Compared with control plants supplied with all nutrients throughout, N- or P-starvation consistently depressed the rates of ethylene release by excised, 25 mm apical segments of adventitious roots. Some enzymes and substrates of the ethylene biosynthetic pathway were examined. The content of 1-amino cyclopropane-1-carboxylic acid (ACC) paralleled the differences in ethylene production rates, being depressed by N or P deficiency, while malonyl-ACC showed a similar trend. Activity of ACC synthase and of ethylene forming enzyme (g-1 fresh weight) was also greater in control roots than in nutrient starved ones. These results indicate that much of the ethylene biosynthetic pathway is slowed under conditions of N- or P-starvation. Thus, by contrast to the effects of hypoxia, the induction of aerenchyma in roots of *Zea mays* by nutrient starvation is not related to an enhanced biosynthesis and/or accumulation of ethylene in the root tips. Plant physiology. Sept 1989. v. 91 (1). p. 266-271. Includes references. (NAL Call No.: DNAL 450 P692).

### 1006

Differential imazaquin tolerance and behavior in selected corn (*Zea mays*) hybrids. WEESA6. Sander, K.W. Barrett, M. Champaign, Ill. : Weed Science Society of America. 'Cargill 921', 'Great Lakes 422', Northrup King 9410', 'Pioneer 3901', 'Pioneer 3737', and 'Stauffer 5650' corn hybrids were tested in the greenhouse for imazaquin tolerance. Imazaquin rates that reduced shoot growth 50%, when compared to the untreated hybrid check, ranged from 17 to 50 g/ha. When averaged together, the three most tolerant hybrids (Cargill 921, Pioneer 3901, and Great Lakes 422) were approximately one-half as sensitive to imazaquin as the three least tolerant hybrids (Northrup King 9410, Pioneer 3737, and Stauffer 5650). Studies were conducted to determine if the observed differential tolerance was caused by differences in acetolactate synthase (ALS, EC 4.1.3.18) levels and sensitivity of ALS to imazaquin. Differential imazaquin uptake, translocation, and/or metabolism were also studied as a basis for the tolerance range as was seed size and seedling growth. There were differences among hybrids in the physiological and growth parameters studied; however, these differences did not correlate with imazaquin tolerance. None of the factors studied could alone account for the differences in imazaquin tolerance. Weed science. May 1989. v. 37 (3). p. 290-295. Includes references. (NAL Call No.: DNAL 79.8 W41).

### 1007

#### Differential response of corn hybrids and inbreds to metolachlor.

WEESA6. Rowe, L. Rossman, E.; Penner, D. Champaign, Ill. : Weed Science Society of America. Greenhouse studies were conducted to determine the response of 200 corn hybrids and 29 inbreds to metolachlor applied at 4.5 kg ai ha-1. Both hybrids and inbreds varied in their response to the herbicide. The distribution of injury revealed a normal distribution curve with most of the hybrids having a midlevel of tolerance. Some hybrids were very tolerant, while others were quite sensitive. Laboratory studies were conducted to evaluate absorption and metabolism of 14C-metolachlor for a subset of tolerant and sensitive hybrids. There was no observed difference in the product of metolachlor metabolism in the tolerant and sensitive hybrids. The observed variability in metolachlor tolerance among hybrids appeared due to differences in the amount of metolachlor absorption and metabolism and differences at the site of metolachlor action. The tolerant 'Great Lakes 584' hybrid absorbed significantly less 14C-metolachlor than did the sensitive 'Pioneer 3744', while the tolerant 'Cargill 7567' metabolized significantly faster more 14C-metolachlor than the other hybrids. The internal concentrations of available 14C-metolachlor were the same for the tolerant Cargill 7567 and the sensitive 'Northrup King 9283' after 8 h, indicating differences at the site of action of metolachlor for these two hybrids. Weed science. Nov 1990. v. 38 (6). p. 563-566. Includes references. (NAL Call No.:

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DNAL 79.8 W41).

1008

### **Effect of atrazine and tillage on alfalfa (*Medicago sativa*) establishment in corn (*Zea mays*)-alfalfa rotation.**

WETEE9. Kells, J.J. Leep, R.H.; Tesar, M.B.; Leavitt, R.A.; Cudnohufsky, J. Champaign, Ill. : The Society. *Weed technology : a journal of the Weed Science Society of America*. Apr/June 1990. v. 4 (2). p. 360-365. ill. Includes references. (NAL Call No.: DNAL SB610.W39).

1009

### **Effect of BAS-145-138 as an antidote for sulfonylurea herbicides.**

WETEE9. Devlin, R.M. Zbiec, I.I. Champaign, Ill. : The Society. *Weed technology : a journal of the Weed Science Society of America*. Apr/June 1990. v. 4 (2). p. 337-340. Includes references. (NAL Call No.: DNAL SB610.W39).

1010

### **Effect of insecticide treatments on root lodging and yields of maize in controlled infestations of western corn rootworms (Coleoptera: Chrysomelidae).**

JEENAI. Sutter, G.R. Fisher, J.R.; Elliott, N.C.; Branson, T.F. Lanham, Md. : Entomological Society of America. Granular soil insecticides were applied at planting time to plots of maize (*Zea mays L.*) infested with known populations of eggs of western corn rootworm, *Diabrotica virgifera virgifera* LeConte, to determine how treatments protected plants from root lodging and yield loss caused by larval feeding. The percentage of lodged plants increased significantly with increases in egg density. Percentage lodging in untreated plots also differed significantly between years, and there was a significant year-by-egg density interaction. Insecticides significantly reduced root lodging, but lodging in carbofuran-treated plots was greater than in all other treatments. Percentage yield loss caused by larval feeding was consistent each year for each egg density, and yield loss was significantly greater in plots infested with higher egg densities. Terbufos and isofenphos were not consistent in preventing yield loss; these insecticides caused a significant year-by-treatment interaction. As main effects, yield protection by insecticides was consistent each year, and the insecticides did not differ in their ability to protect yield. Yields in treated plots infested with 300 and 600 eggs per 0.3 m of row did not differ significantly from untreated plots; however, yields in treated plots infested with 1,200 and 2,400 eggs per 0.3 m of row were significantly higher when insecticides were used. Correlations between root damage ratings and yields of untreated plants were highly significant. For insecticide-treated plots, root damage ratings were not significantly correlated with yield,

which suggests that root damage ratings are poor criteria for evaluating insecticide efficacy. *Journal of economic entomology*. Dec 1990. v. 83 (6). p. 2414-2420. Includes references. (NAL Call No.: DNAL 42i J822).

1011

### **The effect of sethoxydim on corn (*Zea mays*) and giant foxtail (*Setaria faberii*).**

WEESA6. Chernicky, J.P. Gast, R.; Slife, F.W. Champaign, Ill. : Weed Science Society of America. Corn and giant foxtail response to foliar-applied sethoxydim at 67, 134, and 200 g ai/ha was evaluated in field studies. Sethoxydim applied over the top of corn (60 cm tall) caused greater whorl damage and reduced corn grain yield more than postdirected sethoxydim. Sethoxydim controlled giant foxtail best when used in conjunction with a preemergence application of metolachlor (2.2 kg/ha) and atrazine (1.7 kg/ha). *Weed science*. July 1989. v. 37 (4). p. 600-603. Includes references. (NAL Call No.: DNAL 79.8 W4i).

1012

### **Effect of triazine residue on winter wheat following field corn.**

PNWSB. Webb, F. Causey, M. College Park, Md. : The Society. *Proceedings of the annual meeting - Northeastern Weed Science Society*. 1990. v. 44. 78-79. (NAL Call No.: DNAL 79.9 N814).

1013

### **Effects of diclofop and diclofop-methyl on membrane potentials in roots of intact oat, maize, and pea seedlings.**

PLPFA. DiTomaso, J.M. Brown, P.H.; Stowe, A.E.; Linscott, D.L.; Kochian, L.V. Rockville, Md. : American Society of Plant Physiologists. Growth and electrophysiological studies in roots of intact diclofop-methyl susceptible and resistant seedlings were conducted to test the hypothesis that the herbicide acts primarily as a proton ionophore. The ester formulation of diclofop, at 0.2 micromolar, completely inhibited root growth in herbicide-susceptible oat (*Avena sativa L.*) after a 96 hour treatment, but induced only a delayed transient depolarization of the membrane potential in oat root cortical cells. Root growth in susceptible maize (*Zea mays L.*) seedlings was dramatically reduced by exposure to 0.8 micromolar diclofop-methyl, while the same diclofop-methyl exposure hyperpolarized the membrane potential within 48 hours after treatment. Furthermore, exposure of maize roots to the protonophore, carbonyl cyanide m-chlorophenylhydrazone (CCCP) (50 nanomolar), inhibited growth by only 31%, 96 hours after treatment, while the same CCCP exposure depolarized the resting potential by an average of 32 millivolts. Thus, the protonophore hypothesis cannot account for a differential membrane response to phytotoxic levels of diclofop-methyl in two susceptible species. From the results of others, much of

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the evidence to support the protonophore hypothesis was obtained using high concentrations of diclofop acid (100 micromolar). At a similar concentration, we also report a rapid (3 minute) diclofop-induced depolarization of the membrane potential in roots of susceptible oat and maize, moderately tolerant barley (*Hordeum vulgare L.*), and resistant pea (*Pisum sativum L.*) seedlings. Moreover, 100 micromolar diclofop acid inhibited growth in excised cultured pea roots. In contrast, 100 micromolar diclofop-methyl did not inhibit root growth. Since the membrane response to 100 micromolar diclofop acid does not correspond to differential herbicide sensitivity under field conditions, results obtained with very high levels of diclofop acid are probably physiologically irrelevant. The results of this study suggest that th. Plant physiology. Apr 1991. v. 95 (4). p. 1063-1069. Includes references. (NAL Call No.: DNAL 450 P692).

1014

### Effects of diclofop and haloxyfop on lipid synthesis in corn (*Zea mays*) and bean (*Phaseolus vulgaris*).

WEESA6. Boldt, L.D. Barrett, M. Champaign, Ill. : Weed Science Society of America. Diclofop-methyl and haloxyfop-methyl (0.001 to 10 micromoles) caused 9 to 61% inhibition of <sup>14</sup>C-acetate incorporation into lipids in corn leaf segments within 1 h of herbicide treatment, while neither herbicide affected this process in bean leaf segments. The herbicides did not affect <sup>14</sup>C-malonate incorporation into lipids in corn leaf segments. Diclofop-methyl and haloxyfop-methyl reduced <sup>14</sup>C-acetate incorporation into polar lipids and triglycerides in corn while incorporation into sterols was increased. In vitro activity of acetyl-coenzyme A carboxylase (EC 6.4.1.2) was inhibited from 26 to 94% within 5 min of exposure to the herbicides (1 to 10 micromoles). Diclofop acid inhibited this enzyme activity more than did haloxyfop acid. Differences in field activity between diclofop-methyl and haloxyfop-methyl are not related to differential sensitivity of acetyl-coenzyme A carboxylase to the two herbicides. Weed science. Apr/June 1991. v. 39 (2). p. 143-148. Includes references. (NAL Call No.: DNAL 79.8 W41).

1015

### Effects of ethephon on corn at different N levels.

PNWSB. Else, M.J. Ilnicki, R.D.; Enache, A.J. College Park, Md. : The Society. Proceedings of the annual meeting - Northeastern Weed Science Society. Meeting held January 6, 7 & 8, 1988 in Hartford, Connecticut. 1988. v. 42. p. 13-17. Includes references. (NAL Call No.: DNAL 79.9 N814).

1016

### Effects of napropamide on growth and anatomy of corn, *Zea mays*, roots.

WEESA6. Di Tomaso, J.M. Ashton, F.M.; Rost, T.L. Champaign, Ill. : Weed Science Society of America. Structural studies were conducted to evaluate the effects of napropamide on growth and development of corn roots. At 1.0 and 10.0 micrometer napropamide, root growth was inhibited severely within 3 days of seed germination. Root diameter within 1 mm of the root apex doubled and numerous lateral root primordia were observed within 10 mm of the meristem tip in treated roots. The number of cortical parenchyma cell files, xylem vessel, and phloem sieve tube strands also significantly increased. Average cortical cell size did not change, regardless of the treatment. A lateral expansion of the meristematic region of the root coincided with a slight reduction in meristem length but resulted in an overall increase in meristem volume. However, enlargement of the meristem occurred despite a reduction in the number of mitotic figures in the root meristem. Treatment of excised root tips for 24 h with 20 micrometer napropamide reduced the number of mitotic figures 84%. Nomenclature: Napropamide, N,N-diethyl-2-(1-naphthalen-oxo) propionamide; corn, *Zea mays* L. 'Iochief'. Weed science. July 1988. v. 36 (4). p. 457-463. ill. Includes references. (NAL Call No.: DNAL 79.8 W41).

1017

### Effects of tillage on trifluralin residue carryover injury to corn (*Zea mays*).

WEESA6. Hartzler, R.G. Fawcett, R.S.; Owen, M.D.K. Champaign, Ill. : Weed Science Society of America. Trifluralin was evaluated at 1.1, 2.2, and 4.5 kg/ha in 1983 and 1984 at two locations in Iowa for residue carryover injury to corn the following seasons. Three methods of seedbed preparation (no-till, moldboard, and chisel plowing) for corn planting were also examined. There was no effect on corn growth at the 1.1 kg/ha rate of trifluralin. Averaged over the four experiments, reductions in corn height of 8 and 24% were observed 5 weeks after planting at 2.2 and 4.5 kg/ha, respectively. The relative degree of stunting due to trifluralin decreased as the growing season progressed. Early-season carryover injury was more severe in reduced tillage than in moldboard plow treatments in the 1983-1984 Nashua experiment. Moldboard and chisel plowing reduced the concentration of trifluralin in the 0- to 7.5-cm zone of the soil profile by 62 and 31%, respectively, when compared to no-till. No yield reductions were observed at the 1.1 or 2.2 kg/ha rate of trifluralin. In 1984, grain yields were reduced by 8 and 16% at Ames and Nashua, respectively, by the 4.5 kg/ha trifluralin rate. Weed science. July 1989. v. 37 (4). p. 609-615. Includes references. (NAL Call No.: DNAL 79.8 W41).

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1018

### Effects of trifluralin on corn (*Zea mays*) growth and nutrient content.

WEESA6. Hartzler, R.G. Fawcett, R.S.; Taber, H.G. Champaign, Ill. : Weed Science Society of America. Glasshouse experiments were conducted to determine the effects of trifluralin on root growth and mineral relations of corn seedlings. Root weight to shoot weight ratios of corn seedlings were positively correlated to concentrations of trifluralin in soil. Root length to shoot weight ratios, however, were inversely related to trifluralin concentrations. Phosphorous and potassium concentrations in shoot tissue were reduced 60 and 35%, respectively, by 0.25 mg trifluralin kg<sup>-1</sup> soil. Growth inhibition due to trifluralin was partially overcome by supplementing soil with nutrients. Weed science. Nov 1990. v. 38 (6). p. 468-470. Includes references. (NAL Call No.: DNAL 79.8 W41).

1019

### Efficacy and mode of action of CGA-154281, a protectant for corn (*Zea mays*) from metolachlor injury.

WEESA6. Rowe, L. Kells, J.J.; Penner, D. Champaign, Ill. : Weed Science Society of America. Greenhouse and field studies were conducted to determine the influence of herbicide rate, hybrid variability, and soil moisture on the effectiveness of CGA-154281 in protecting corn seedlings from metolachlor injury. High rates of metolachlor caused significant injury to seedlings of sensitive corn hybrids. However, with metolachlor plus CGA-154281, very few injury symptoms were observed, even with the 7.8 kg ha<sup>-1</sup> rate and the most sensitive hybrid. Corn seedlings were not injured by metolachlor plus CGA-154281 at the highest soil moisture level evaluated, whereas those treated with metolachlor alone showed 70% injury. Metolachlor injury increased as soil moisture content increased. In the greenhouse, CGA-154281 did not protect any of the eight weed species tested against injury by 2.2 kg ha<sup>-1</sup> metolachlor. In laboratory studies, CGA-154281 did not alter the absorption of <sup>14</sup>C-metolachlor during an 8-h period. Qualitative comparison of the metabolism of metolachlor in the presence or absence of the protectant indicated that metolachlor was metabolized to a more polar metabolite, believed to be a glutathione conjugate. However, CGA-154281 significantly enhanced the rate of metabolism of metolachlor in three of the four hybrids tested. Metolachlor metabolism activity may already have been functioning at a maximum level in the unaffected hybrid. Weed science. Jan/Mar 1991. v. 39 (1). p. 78-82. Includes references. (NAL Call No.: DNAL 79.8 W41).

1020

### Factors affecting the activity of thifensulfuron.

WEESA6. Zhao, C.C. Teasdale, J.R.; Coffman, C.B. Champaign, Ill. : Weed Science Society of America. The influence of various factors on the tolerance of corn and selected weed species to thifensulfuron was studied in greenhouse experiments. Corn fresh weight was reduced by postemergence application of thifensulfuron when applied at 180 g ai ha<sup>-1</sup> without surfactant or at 18 g ha<sup>-1</sup> with a nonionic surfactant. Corn was more susceptible to root exposure whereas velvetleaf was more susceptible to foliar exposure. Velvetleaf was most susceptible when plants were young, when a nonionic surfactant was added, and at 20 rather than 30 C. Simulated rainfall 8 h after application reduced velvetleaf injury by thifensulfuron at 18 g ha<sup>-1</sup> without surfactant; however, with addition of a nonionic surfactant, velvetleaf injury was reduced only if rainfall occurred less than 2 h after application. Soil moisture level did not affect velvetleaf susceptibility. Weed science. Nov 1990. v. 38 (6). p. 553-557. Includes references. (NAL Call No.: DNAL 79.8 W41).

1021

### Fertility and weed stress effects on performance of maize/soybean intercrop.

AGJOAT. Weil, R.R. McFadden, M.E. Madison, Wis. : American Society of Agronomy. Intercropped corn (*Zea mays* L.) and soybean *Glycine max* (L.) Merr. may produce more total yield per hectare than either grown separately, i.e., land equivalent ratio (LER) greater than or equal to 1. Low N fertility, limited moisture, and weed competition have each been reported to result in high land equivalent ratios. Thus it was hypothesized that intercropping advantages were greater of soil fertility stress (F1 = low N-P-K, F2 = high N-P-K), weed competition stress (W1 = unweeded, W2 weeded), and four cropping systems (M2S, M1S, M2, S; where M2 = high density maize, M1 = low density maize, and S = soybean at normal density) on the performance of maize and soybean, and on the growth of weeds. 'Cargill 921' maize and 'Union' soybean were planted simultaneously in 1985 and 1986 in alternate rows spaced at 0.5 m on a atypic Hapludult in Maryland. Land equivalent ratios and maize equivalent yields were calculated. Dry matter production was determined early in the season, and grain yield plus weed dry matter were determined at final harvest. LER values (mean of 1985 and 1986) ranged from 0.89 (W1F1M2S) to 1.18 (W2F1M1S). The LER data showed that at high fertility levels, weed stress increased the relative advantage of intercropping. In addition, when plots were weeded, LER increased from 0.96 to 1.13 under fertility stress. Maize equivalent yields were calculated from the relative prices of maize and soybeans. The highest maize equivalent yields in all cropping systems in both years occurred under optimal conditions (W2, F2). Agronomy journal. July/Aug 1991. v. 83 (4). p. 717-721. Includes references. (NAL Call No.: DNAL 4 AM34P).

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1022

Fractional integrated stomatal opening to control water stress in the field.  
CRPSAY. Fiscus, E.L. Mahbub-Ul Alam, A.N.M.; Hirasawa, T. Madison, Wis. : Crop Science Society of America. The usefulness of totally automated irrigation control systems is well established. Mass-flow porometers can be used as the sensing and feedback elements to implement such a system for the experimental control of water stress in the field. This study was conducted to determine if consistent relationships could be established between the mass-flow readings and other water-related physiological parameters. A range of stress conditions were imposed on plots of corn (*Zea mays L.*) by the system during the 1986 and 1987 field seasons in Greeley, CO. Midday leaf xylem water potential, leaf diffusive conductance, and year-end grain yields were measured during both years. In 1987, additional measurements were made of the infrared canopy temperature for calculating the Crop Water Stress Index (CWSI), and individual kernel weights and numbers, to determine the components of the grain yield predictions observed in 1986. Reductions in the number of kernels produced per unit land area were associated with stress-induced delays of silking relative to pollen shed. Additional yield reductions in some treatments were attributable to reduced weight per kernel. Significant correlations were found between the mass-flow sensors and grain yield and CWSI. The relationship between grain yield and stomatal conductance was consistent over both years, suggesting that the cumulative mean conductance may be useful as a yield predictor. Crop science. July/Aug 1991. v. 31 (4). p. 1001-1008. Includes references. (NAL Call No.: DNAL 64.8 C883).

1023

Growth and physiological responses of normal, dwarf, and albino corn (*Zea mays*) to clomazone treatments.

PCBPB. Vencill, W.K. Hatzios, K.K.; Wilson, H.P. Duluth, Minn. : Academic Press. Pesticide biochemistry and physiology. Sept 1989. v. 35 (1). p. 81-88. 111. Includes references. (NAL Call No.: DNAL SB951.P49).

1024

Herbicidal effects of fomesafen.

PNWSB. Devlin, R.M. Koszanski, Z.K. College Park, Md. : The Society. Proceedings of the annual meeting - Northeastern Weed Science Society. Meeting held January 6, 7 & 8, 1988 in Hartford, Connecticut. 1988. v. 42. p. 67-72. Includes references. (NAL Call No.: DNAL 79.9 N814).

1025

In-furrow insecticide interactions with Accent and Beacon.

LOAGA. Reynolds, D.B. Burris, E.; Leonard, B.R. Baton Rouge, La. : The Station. Louisiana agriculture - Louisiana Agricultural Experiment Station. Summer 1991. v. 34 (4). p. 3-4, 19. (NAL Call No.: DNAL 100 L939).

1026

Influence of available soil water content, temperature, and CGA-154281 on metolachlor injury to corn.

WEESAG. Viger, P.R. Eberlein, C.V.; Fuerst, E.P. Champaign, Ill. : Weed Science Society of America. The effects of the antidote CGA-154281, available soil water (ASW), and soil temperature on corn injury from preemergence applications of metolachlor were evaluated in field and growth chamber studies. In field studies, metolachlor at rates of 5.6, 8.4, and 11.2 kg ha<sup>-1</sup> caused corn injury when there was sufficient ASW before corn emergence to activate the herbicide. Injury was prevented when CGA-154281 was applied with metolachlor (30:1, metolachlor:CGA-154281 by wt). The effects of surface-soil ASW, soil temperature, and CGA-154281 on corn tolerance to metolachlor were further evaluated in growth chamber studies. Corn injury from metolachlor was more severe when the surface soil was wet for 5 days immediately after herbicide treatment than when the surface-soil was dry. Corn injury from metolachlor also was greater when corn was grown under cool temperatures (21/13 C, day/night) than when grown under warm temperatures (30/21 C, day/night).

CGA-conferred 154281 protection against metolachlor injury regardless of surface soil ASW or growth temperature. Weed science. Apr/June 1991. v. 39 (2). p. 227-231. Includes references. (NAL Call No.: DNAL 79.8 W41).

1027

Inhibition of auxin transport by isoquinolinedione herbicides.

JPGRDI. Gardner, G. Semple, J.E. New York, N.Y. : Springer. Journal of plant growth regulation. Summer 1990. v. 9 (3). p. 161-169. Includes references. (NAL Call No.: DNAL QK745.J6).

1028

Inhibition of chloroplast-mediated reactions by quizalofop herbicide.

WEESAG. Ruizzo, M.A. Gorski, S.F. Champaign, Ill. : Weed Science Society of America. A mechanism of action of the ethyl ester of quizalofop was determined in monocotyledonous and dicotyledonous plants. Quizalofop inhibited electron transport in both cucumber and corn chloroplasts. In corn, inhibition of electron transport was more pronounced under phosphorylating conditions. Half-maximal inhibition (I<sub>50</sub>) of ATP synthesis was achieved

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with a 75-microM concentration of quizalofop in coupled corn chloroplasts. Cucumber chloroplast ATP synthesis was not inhibited at herbicide concentrations up to 100 microM. Corn chloroplast fractions contained greater quantities of bound U-14C quizalofop ester following incubation in light and dark assays. Thin-layer radiochromatograms of 14C-labeled quizalofop showed no metabolism or degradation of parent ester incubated in light and dark chloroplast-mediated reactions. In our studies, it is apparent that the inhibitory action of quizalofop was due to the parent ester. The ester formulation of quizalofop appears to exhibit multiple activity in susceptible plant chloroplasts. *Weed science*. Nov 1988. v. 36 (6). p. 713-718. Includes references. (NAL Call No.: DNAL 79.8 W41).

1029

### Inhibition of corn acetyl-CoA carboxylase by cyclohexanone and aryloxyphenoxypropionate herbicides.

PCPB. Burton, J.D. Gronwald, J.W.; Somers, D.A.; Gengenbach, B.G.; Wyse, D.L. Duluth, Minn. : Academic Press. *Pesticide biochemistry and physiology*. May 1989. v. 34 (1). p. 76-85. Includes references. (NAL Call No.: DNAL SB951.P49).

1030

### Is polyamine biosynthesis a possible site of action of cinmethylin and artemisinin?

PCPB. DiTomaso, J.M. Duke, S.O. Duluth, Minn. : Academic Press. The effects of artemisinin, a naturally occurring sesquiterpene lactone, and the structurally similar herbicide cinmethylin on polyamine production were examined in seedlings of lettuce, corn, and pea. Although the antimalarial activity of artemisinin in animal cell cultures is associated with a dramatic reduction in the concentration of putrescine, results presented here indicate plants treated with growth-inhibiting concentrations of artemisinin or cinmethylin generally display only slightly reduced endogenous levels of putrescine and spermidine. In addition, simultaneous addition of 0.5 millimoles putrescine to artemisinin- or cinmethylin-treated excised corn and pea root cultures could not prevent a reduction in root growth. Similarly, the addition of putrescine to artemisinin-treated lettuce seedlings did not protect against artemisinin-induced chromosome decondensation. These results suggest that the primary biochemical activity of cinmethylin and artemisinin, which leads to inhibition in root growth, does not involve a block in the polyamine biosynthetic pathway. *Pesticide biochemistry and physiology*. Feb 1991. v. 39 (2). p. 158-167. 111. Includes references. (NAL Call No.: DNAL SB951.P49).

1031

**Kinetics of inhibition of acetyl-coenzyme A carboxylase by sethoxydim and haloxyfop.**  
PCPB. Burton, J.D. Gronwald, J.W.; Keith, R.A.; Somers, D.A.; Gengenbach, B.G.; Wyse, D.L. Duluth, Minn. : Academic Press. The mechanism of inhibition of acetyl-CoA carboxylase by sethoxydim and haloxyfop was examined using a semipurified enzyme preparation extracted from Black Mexican Sweet Maize (*Zea mays L.*) suspension-culture cells. As determined by SDS-PAGE and Western blotting, the enzyme preparation contained a major biotin-containing polypeptide (Mr 222,000) and a minor biotin-containing polypeptide (Mr 73,400). The kinetics of enzyme inhibition by sethoxydim and haloxyfop were determined for the substrates MgATP, HCO<sub>3</sub>(-), and acetyl-CoA. Sethoxydim and haloxyfop were linear, noncompetitive inhibitors for the three substrates, and the pattern of inhibition was similar for both herbicides. The K<sub>i</sub>s values for sethoxydim were 1.9, 5.6, and 13.3 KM for acetyl-CoA, HCO<sub>3</sub>(-) and MgATP, respectively. The K<sub>i</sub>s values for haloxyfop were 0.36, 0.87, and 2.89 micromoles for acetyl-CoA, HCO<sub>3</sub>(-) and MgATP, respectively. For both herbicides, K<sub>i</sub>s < K<sub>ii</sub> for acetyl-CoA, whereas K<sub>ii</sub> < K<sub>i</sub>s for MgATP and HCO<sub>3</sub>(-). The kinetic data suggest that the transcarboxylation reaction catalyzed by acetyl-CoA carboxylase (acetyl-CoA leads to malonyl-CoA) is more sensitive to inhibition than is the biotin carboxylation reaction. Kinetic analysis also indicated that sethoxydim and haloxyfop are reversible, mutually exclusive inhibitors of acetyl-CoA carboxylase. *Pesticide biochemistry and physiology*. Feb 1991. v. 39 (2). p. 100-109. 111. Includes references. (NAL Call No.: DNAL SB951.P49).

1032

### Lack of correlation of in vitro antibiosis with antagonism of ice nucleation active bacteria on leaf surfaces by non-ice nucleation active bacteria.

PHYTAU. Lindow, S.E. St. Paul, Minn. : American Phytopathological Society. *Phytopathology*. Literature review. Apr 1988. v. 78 (4). p. 444-450. Includes references. (NAL Call No.: DNAL 464.8 P56).

1033

**Mefluidide: a synthetic chemical that protects corn and rice seedlings from chilling injury.**  
L1, P.H. Boca Raton, FL : CRC Press, c1989. Low temperature stress physiology in crops / editor, Paul H. Li. p. 167-176. 111. Includes references. (NAL Call No.: DNAL SB781.L68).

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1034

**Mode of action of the dichloroacetamide antidote BAS 145-138 in corn.**

PCPB. Fuerst, E.P. Lamoureux, G.L.; Ahrens, W.H. Duluth, Minn. : Academic Press. The effect of BAS 145-138 (BAS) on metazachlor injury to corn and on the fate of <sup>14C</sup> metazachlor in corn seedlings was investigated. Corn shoot and root growth were inhibited by metazachlor. The antidote, BAS, increased corn shoot and root tolerance to metazachlor 10.7- and 7.6-fold, respectively. The antidotal activities of BAS and dichlormid were similar. Corn seedlings grown in soil treated with <sup>14C</sup> metazachlor +/- BAS were dissected at two growth stages prior to emergence and one growth stage immediately after emergence. Parent <sup>14C</sup> metazachlor was present as < 6% of the total radioactivity with an estimated tissue concentration of < 1 micromole in all tissues except the pericarp. This suggests that metazachlor was metabolized rapidly in both antidoted and control plants and that a very low concentration of metazachlor is required for phytotoxicity. BAS treatment reduced the concentration of parent metazachlor in the developing leaves by 82-84%. BAS treatment had three effects that contributed to the reduced amount of parent <sup>14C</sup> metazachlor in the developing leaves: (i) shoot absorption of <sup>14C</sup> metazachlor was slightly reduced by antidote treatment; (ii) the mobility of <sup>14C</sup> was reduced in antidoted seedlings, as indicated by the 63-86% decrease of total <sup>14C</sup> reaching the developing leaves; (iii) metabolism of metazachlor in growing tissues may have been stimulated by BAS, as suggested by the lower percentage of <sup>14C</sup> present as parent metazachlor. The coleoptile plays a critical role in corn shoot tolerance to metazachlor, since more metazachlor is absorbed through the coleoptile than through the mesocotyl and corn is more sensitive to metazachlor absorbed through the coleoptile than the mesocotyl. Reduced absorption and movement of metazachlor through the coleoptile apparently contribute to antidote activity. Results are consistent with the hypothesis that BAS protects corn from metazachlor injury by reducing levels of parent metazachlor present in sensitive a. Pesticide biochemistry and physiology. Feb 1991. v. 39 (2). p. 138-148. Includes references. (NAL Call No.: DNAL SB951.P49).

1035

**Ozone-metolachlor interactions on corn (*Zea mays*), bean (*Phaseolus vulgaris*), and soybean (*Glycine max*).**

WETEE9. Mersie, W. Mebrahtu, T.; Rangappa, M. Champaign, Ill. : The Society. Weed technology : a journal of the Weed Science Society of America. Oct/Dec 1989. v. 3 (4). p. 650-653. Includes references. (NAL Call No.: DNAL SB610.W39).

1036

**Persistence of sulfonylureas in Pullman clay loam.**

WETEE9. Wiese, A.F. Wood, M.L.; Chenault, E.W. Champaign, Ill. : The Society. Weed technology : a journal of the Weed Science Society of America. July 1988. v. 2 (3). p. 251-256. Includes references. (NAL Call No.: DNAL SB610.W39).

1037

**Protection of corn (*Zea mays*) and sorghum (*Sorghum bicolor*) from imazethapyr toxicity with antidotes.**

WEESA6. Barrett, M. Champaign, Ill. : Weed Science Society of America. Antidotes were evaluated under greenhouse conditions for their ability to prevent injury to corn and sorghum from imazethapyr. Corn was more tolerant to imazethapyr and more effectively protected from imazethapyr toxicity than sorghum. Naphthalic anhydride (NA)3, CGA 92194, or flurazole treatment of corn seed reduced plant injury from preemergence applications of imazethapyr. Corn injury from postemergence applications of imazethapyr was decreased by seed treatment with NA or CGA 92194. Sorghum injury from preemergence applications of imazethapyr was not reduced by seed treatment with the antidotes. NA treatment of sorghum seed was the most effective antidote treatment for decreasing injury from postemergence application of imazethapyr but the level of sorghum protection was much less than that achieved with corn. Corn seedlings grown from NA-treated and untreated seed absorbed equal amounts of <sup>14C</sup> into the roots from nutrient solution containing <sup>14C</sup>-imazethapyr. The NA-treated corn plants translocated less of the absorbed <sup>14C</sup> to the shoots than the untreated plants. NA treatment of corn seeds increased the rate of imazethapyr conversion to soluble metabolites 2- and 10-fold in the corn seedling roots and shoots, respectively. The increased rate of imazethapyr metabolism in corn following NA seed treatment may be responsible for the protection from imazethapyr toxicity. Weed science. May 1989. v. 37 (3). p. 296-301. Includes references. (NAL Call No.: DNAL 79.8 W41).

1038

**A rapid, sensitive soil bioassay for sulfonylurea herbicides.**

WEESA6. Sunderland, S.L. Santelmann, P.W.; Baughman, T.A. Champaign, Ill. : Weed Science Society of America. The concentration of three sulfonylurea herbicides in soil was determined by a modified petri dish bioassay procedure. The method involved planting pregerminated seed of selected species in petri dishes containing 65 to 100 g of treated soil and measuring the radicle lengths after 24 h. Chlorimuron was detected in two soils at 0.002 pg g<sup>-1</sup> using either corn, sorghum, or sicklepod as the assay species. Chlorsulfuron and CGA-131036 were detected in soils at 0.001 microgram g<sup>-1</sup> using

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corn, and chlorsulfuron was detected at the same level using sicklepod. In contrast to other methods, the bioassay procedure described could be completed in 48 h, including pregermination of the seed, growth of the plants on treated soil, and plant measurements. Weed science. Apr/June 1991. v. 39 (2). p. 296-298. Includes references. (NAL Call No.: DNAL 79.8 W41).

1039

### Reduction of imazaquin injury to corn (*Zea mays*) and sorghum (*Sorghum bicolor*) with antidotes.

WEESA6. Barrett, M. Champaign, Ill. : Weed Science Society of America. Antidotes were evaluated for their ability to prevent corn and sorghum injury caused by imazaquin. Plant injury was reduced in both preemergence and early postemergence imazaquin applications. Naphthalic anhydride (NA)3 seed treatment was the most consistent compound in reducing the imazaquin injury. Seed treatment with CGA 92194 or flurazole also gave injury protection to corn and sorghum, while soil treatment with dichlorimid provided the least protection from imazaquin injury. Treatment with the antidotes did not affect the acetolactate synthase (ALS)3 (EC4.1.3.18) activity in corn or sorghum tissues. Imazaquin treatments decreased extractable ALS activity but this decrease was eliminated, partially or totally, by the most effective antidotes. Antidote treatments had little effect on absorption and distribution of <sup>14</sup>C in plants growing in soil treated with <sup>14</sup>C-imazaquin. Antidote treatments increased the metabolism of <sup>14</sup>C-imazaquin to both soluble and unextractable <sup>14</sup>C after 24 h of exposure. The increased rate of imazaquin conversion to less toxic metabolites when antidotes were used resulted in a reduction in imazaquin injury to corn and sorghum. Weed science. Jan 1989. v. 37 (1). p. 34-41. Includes references. (NAL Call No.: DNAL 79.8 W41).

1040

### Residual effects of CGA-131036 and chlorsulfuron on spring-sown rotational crops.

WEESA6. Friesen, G.H. Wall, D.A. Champaign, Ill. : Weed Science Society of America. Response of flax, canola, field pea, sunflower, field corn, lentils, and common buckwheat to soil residues of CGA-131036 and chlorsulfuron applied at 22 g ai ha<sup>-1</sup> was determined on two soil types at Morden, Manitoba. On a fine sandy loam with a pH of 7.4 and 4.5% organic matter, the length of time required before crops showed no phytotoxicity from CGA-131036 residues was: sunflower 4 yr; canola and common buckwheat 3 yr; flax 2 yr; field pea and field corn 1 yr. On a clay loam with a pH of 6.5 and 5.3% organic matter, the corresponding duration was: lentil, canola, and sunflower 3 yr; flax and field pea 1 yr. Chlorsulfuron residues persisted somewhat longer than CGA-131036 residues on the sandy loam but not on the clay loam. Weed science. Apr/June 1991. v. 39 (2). p. 280-283. Includes references. (NAL Call No.: DNAL 79.8 W41).

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1041

### Response of corn (*Zea mays*) cultivars to imazaquin.

WEESA6. Renner, K.A. Meggitt, W.F.; Penner, D. Champaign, Ill. : Weed Science Society of America. Corn cultivars differed in their response to imazaquin applied from 35 to 280 g ai/ha, as measured by shoot length. No cultivar was tolerant to all imazaquin application rates. There was less corn injury from imazaquin in studies conducted during the second and third years of research than in the first year. Preplant-incorporated applications caused significantly more injury than preemergence applications in two out of three studies. Lack of rainfall in 1985 and 1987 may have limited movement of imazaquin in the soil profile, which resulted in preemergence applications of imazaquin, causing very little corn injury. In all years of research, 35 g/ha of imazaquin incorporated in the top 6 cm of the soil profile resulted in 17 to 33% reduction in corn height 28 days after planting, when averaged across all the corn cultivars. Significant yield reductions (LSD = 0.10) of 45, 19, and 18% occurred in 1987 from preplant-incorporated applications of 140, 70, and 35 g/ha, respectively, which had reduced corn height 46, 23, and 19%, respectively, when measured 28 days after planting. Weed science. Sept 1988. v. 36 (5). p. 625-628. Includes references. (NAL Call No.: DNAL 79.8 W41).

1042

### Response of corn (*Zea mays*), soybean (*Glycine max*), and several weed species to dark-applied photodynamic herbicide modulators.

WEESA6. Mayasich, J.M. Mayasich, S.A.; Rebeiz, C.A. Champaign, Ill. : Weed Science Society of America. The photodynamic herbicidal performance of delta-aminolevulinic acid in combination with four chlorophyll biosynthesis modulators was evaluated under greenhouse conditions, using corn, soybean, and ten weed species. Treatments resulted in accumulation of various amounts of protoporphyrin IX and of monovinyl and divinyl Mg-protoporphyrin IX and protochlorophyllide. Accumulation of these tetrapyrroles was accompanied by various degrees of photodynamic injury, depending on treatment, plant species, and somewhat the modulator. The lower photodynamic susceptibility of dark monovinyl/light monovinyl and dark divinyl/light divinyl plants toward the accumulation of monovinyl and divinyl protochlorophyllide, respectively, was attributed to their greater abilities to metabolize these protochlorophyllides in the light. On the other hand, the higher photodynamic susceptibility of the dark monovinyl/light divinyl weed species toward the accumulation of monovinyl protochlorophyllide was attributed to their lower ability to metabolize the accumulated monovinyl protochlorophyllide in the light. Weed science. Jan 1990. v. 38 (1). p. 10-15. Includes

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references. (NAL Call No.: DNAL 79.8 W41).

1043

### Response of different plants to ammonium and nitrate as sources of nitrogen with application of fungicides.

JPNUDS. Feng, J. Barker, A.V. New York, N.Y. : Marcel Dekker. Journal of plant nutrition. 1990. v. 13 (5). p. 495-512. Includes references. (NAL Call No.: DNAL QK867.J67).

1044

### Rotational crop response to repeated applications of norflurazon.

WETEE9. Keeling, J.W. Lloyd, R.W.; Abernathy, J.R. Champaign, Ill. : The Society. Weed technology : a journal of the Weed Science Society of America. Jan/Mar 1989. v. 3 (1). p. 122-125. Includes references. (NAL Call No.: DNAL SB610.W39).

1045

### Selection and characterization of sethoxydim-tolerant maize tissue cultures.

PLPFA. Parker, W.B. Somers, D.A.; Wyse, D.L.; Keith, R.A.; Burton, J.D.; Gronwald, J.W.; Gengenbach, B.G. Rockville, Md. : American Society of Plant Physiologists. 'Black Mexican Sweet' (BMS) maize (*Zea mays* L.) tissue cultures were selected for tolerance to sethoxydim. Sethoxydim, a cyclohexanedione, and haloxyfop, an aryloxyphenoxypropionate, exert herbicidal activity on most monocots including maize by inhibiting acetyl-coenzyme A carboxylase (ACCase). Selected line B10S grew on medium containing 10 micromolar sethoxydim. Lines B50S and B100S were subsequent selections from B10S that grew on medium containing 50 and 100 micromolar sethoxydim, respectively. Growth rates of BMS, B10S, B50S, and B100S were similar in the absence of herbicide. Herbicide concentrations reducing growth by 50% were 0.6, 4.5, 35, and 26 micromolar sethoxydim and 0.06, 0.5, 5.4, and 1.8 micromolar haloxyfop for BMS, B10S, B50S, and B100S, respectively. Sethoxydim and haloxyfop concentrations that inhibited ACCase by 50% were similar for BMS, B10S, B50S, and B100S. However, ACCase activities were 6.1, 10.7, 16.1, and 11.4 nmol HCO<sub>3</sub><sup>-</sup> incorporated per milligram of protein per minute in extracts of BMS, B10S, B50S, and B100S, respectively, suggesting that increased wild-type ACCase activity conferred herbicide tolerance. Incorporation of <sup>14</sup>C acetate into the nonpolar lipid fraction was higher for B50S than for BMS in the absence of sethoxydim providing further evidence for an increase in ACCase activity in the selected line. In the presence of 5 micromolar sethoxydim, <sup>14</sup>C acetate incorporation by B50S was similar to that for untreated BMS. The levels of a biotin-containing polypeptide (about 220,000 molecular weight), presumably the ACCase subunit, were increased in the tissue cultures that exhibited elevated ACCase activity.

indicating overproduction of the ACCase enzyme. Plant physiology. Apr 1990. v. 92 (4). p. 1220-1225. illl. Includes references. (NAL Call No.: DNAL 450 P692).

1046

### Tolerance of corn, proso millet and safflower to FMC-57020.

WSWPA. Anderson, R.L. Reno, Nev. : The Society. Proceedings - Western Society of Weed Science. Meeting held on March 8-10, 1988, Fresno, California. 1988. v. 41. p. 130-132. (NAL Call No.: DNAL 79.9 W52).

1047

### Tolerance of corn (*Zea mays*) to Sethoxydim applied with precision postemergence-directed sprayer equipment.

WETEE9. Kleppe, C.D. Harvey, R.G. Champaign, Ill. : The Society. Weed technology : a journal of the Weed Science Society of America. Oct/Dec 1989. v. 3 (4). p. 663-667. illl. Includes references. (NAL Call No.: DNAL SB610.W39).

1048

### Wheat tolerance to fenoxaprop-ethyl, a grass herbicide.

PNWSB. Devlin, R.M. Zbiec, I.I. College Park, Md. : The Society. Proceedings of the annual meeting - Northeastern Weed Science Society. 1990. v. 44. p. 1-5. Includes references. (NAL Call No.: DNAL 79.9 N814).

1049

### Yield response of corn subjected to western corn rootworm (*Coleoptera: Chrysomelidae*) infestation and lodging.

JEENAI. Spike, B.P. Tollefson, J.J. Lanham, Md. : Entomological Society of America. Lodging of corn, *zea mays* L., is often attributed to injury by larvae of western corn rootworm, *Diabrotica virgifera* LeConte. Because leaves of lodged plants exhibit vertical and horizontal spatial aberrations, yield may be adversely affected because of reduced photosynthetic efficiency. In a 2-yr study, we used a factorial arrangement of rootworm infestation (0 and 1,200 eggs per 30.5-cm row) and lodging treatments (lodged and upright) to determine effects on plant biomass and grain yield. In a second study, we examined how plants lodged from rootworm injury differ from upright plants with respect to plant and ear height, root rating, total leaf area, and vertical leaf area distribution. In 1987, rootworm-infested and lodged plants had significantly reduced plant dry weight and grain yield at nearly all sampling dates. Lodging treatments reduced grain yield of infested plants by an additional 11.9% over yield of upright, infested plants. In 1988, no differences in dry weight or yield occurred with infested plants, but lodging

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treatments reduced grain yield by 34.3%. In a severely lodged canopy, plant and ear height and light interception were significantly reduced in comparison with those of upright plants. Linear regressions of incident light versus leaf areas above each 0.31-m increment in the corn canopy resulted in significant slope (light extinction) differences. Because dry weight and yield were more consistently reduced by lodging than by rootworm infestation treatments, lodging must be an important factor in the relation between rootworm infestation and yield loss. *Journal of economic entomology*. Oct 1991. v. 84 (5). p. 1585-1590. Includes references. (NAL Call No.: DNAL 421 J822).

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1050

**Absence of trichothecenes in toxigenic isolates of *Fusarium moniliforme*.**  
APMBA. Mirocha, C.J. Abbas, H.K.; Vesonder, R.F. Washington, D.C. : American Society for Microbiology. Thirty-four isolates of *Fusarium moniliforme* were obtained from cereal grains collected in various parts of the world. The isolates were grown on rice and tested as a diet for toxicity to rats. Of these isolates, 53% caused death, 12% caused congestion and hemorrhage of the stomach and intestine as well as hematuria, 21% caused diarrhea, 38% caused weight loss, and 9% were nontoxic. The cultures were tested for T-2, HT-2, neosolaniol, acetyl-T-2, T-2-tetraol, iso-T-2, diacetoxyscirpenol, monoacetoxyscirpenol, deoxynivalenol, nivalenol, fusarenone-X, 3-acetyldeoxynivalenol, 15-acetyldeoxynivalenol, zearalenone, moniliformin, fusarochromanone, fusarin-C, and wortmannin; all were negative. In addition, *F. moniliforme* NRRL A25820 was grown on corn and banana fruit as solid substrates as well as on a defined liquid medium; none of the above toxins were found. When *F. moniliforme* NRRL A25820 was incorporated into a rat diet, no toxicity was noted. Twenty-eight additional isolates of *F. moniliforme*, isolated from feed associated with equine leukoencephalomalacia, were grown on cracked corn for 2-weeks. The cultures were negative when tested for deoxynivalenol, 15-acetyldeoxynivalenol, diacetoxyscirpenol, monoacetoxyscirpenol, nivalenol, and fusarenone X. Seventy-five percent of the isolates were toxic to ducklings, indicating the presence of a toxin other than trichothecenes. Our results support the conclusion that *F. moniliforme* does not produce trichothecenes. Applied and environmental microbiology. Feb 1990. v. 56 (2). p. 520-525. Includes references. (NAL Call No.: DNAL 448.3 AP5).

1051

**Changes in the distribution of trichothecenes and zearalenone in maize with gibberella ear rot during storage at cool temperatures.**  
PLDIDE. Wicklow, D.T. Bennett, G.A.; Caldwell, R.W.; Smalley, E.B. St. Paul, Minn. : American Phytopathological Society. Plant disease. Apr 1990. v. 74 (4). p. 304-305. Includes references. (NAL Call No.: DNAL 1.9 P69P).

1052

**Combined application of soybean oil and fungicides for dust suppression and control of storage fungi in corn and soybeans.**  
McGee, D.C. Misra, M.K. St. Paul, MN : The Center, 1988? . Soybean utilization alternatives : February 16-18, 1988, a symposium / sponsored by the Center for Alternative Crops and Products ; organizing committee, Leland Hardman ... et al. ; publication editor, Laura McCann. p. 419-421. (NAL Call No.: DNAL SB205.S75693).

1053

**Corn pest management in Wisconsin, 1988.**  
Doersch, R.E. Doll, J.D.; Wedberg, J.L.; Grau, C.R.; Worf, G.L.; Harvey, R.G.; Flashinski, R.A. Madison, Wis. : The Service. Publication - University of Wisconsin, Cooperative Extension Service. 1988. (A1684). 60 p. (NAL Call No.: DNAL S544.3.W6W53).

1054

**The effects of heat treatment and inoculum concentration on growth and sporulation of *Penicillium* spp. on corn genotypes in storage.**  
PHYTA. Yao, B. Tuite, J. St. Paul, Minn. : American Phytopathological Society. The effects of heat treatment and inoculum concentration of *Penicillium brevi-compactum*, *P. cyclopium*, and *P. viridicatum*, on storability of corn kernels were determined in separate tests for 10 genotypes of dent corn and a visual flint (VF) selection. Hand-shelled corn grown during 1983-1985 was used. Kernels of B73 X Mo17 and Dekalb XL67, resistant, and H95 very susceptible and VF, moderately susceptible to storage *Penicillia* were heated at 80 C for 20 min, then inoculated with  $2 \times 10^{(3)}$  spores/g and stored at 88% RH and 14 C for 49 days. Host reaction was determined by a visible mold rating on individual kernels and number of propagules isolated after dilution on a modified potato-dextrose agar. Molding was substantially increased by the heat treatment as measured by propagules and less so by visible mold for all four genotypes. Increase was greater for the resistant hybrids but the disease rankings among the genotypes remained. The heat-treated resistant hybrids did not support significantly more sporulation of *Penicillium* than the unheated, susceptible genotypes. In three tests, a total of 11 corn genotypes were inoculated with  $2 \times 10^{(3)}$  to  $10^{(4)}$  or  $2 \times 10^{(3)}$  to  $10^{(5)}$  spores of *Penicillium* spp. per gram of corn and stored at 13-14 C and 88% RH. Increasing the inoculum to either  $10^{(4)}$  or  $10^{(5)}$  spores/g generally had no significant effect on relative resistance as measured by propagules and visible mold, although there was an increase in propagules with an increase in the amount of inoculum, particularly when  $2 \times 10^{(4)}$  or  $10^{(5)}$  spores/g was used. There appeared to be a more defined separation of hybrids with inoculum at  $2 \times 10^{(4)}$  and  $10^{(5)}$  than at  $2 \times 10^{(3)}$  spores/g. Phytopathology. Oct 1989. v. 79 (10). p. 1101-1104. Includes references. (NAL Call No.: DNAL 464.8 P56).

1055

**Effects of zinc, iron, cobalt, and manganese on *Fusarium moniliforme* NRRL 13616 growth and fusarin C biosynthesis in submerged cultures.**  
APMBA. Jackson, M.A. Slininger, P.J.; Bothast, R.J. Washington, D.C. : American Society for Microbiology. The influence of zinc, iron, cobalt, and manganese on submerged cultures of *Fusarium moniliforme* NRRL 13616 was assessed by measuring dry weight accumulation, fusarin C

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biosynthesis, and ammonia assimilation. Shake flask cultures were grown in a nitrogen-limited defined medium supplemented with various combinations of metal ions according to partial-factorial experimental designs. Zinc (26 to 3,200 ppb 26 to 3,200 ng/ml) inhibited fusarin C biosynthesis, increased dry weight accumulation, and increased ammonia assimilation. Carbohydrate was found to be the principal component of the increased dry weight in zinc-supplemented cultures. Zinc-deficient cultures synthesized more lipid and lipidlike compounds, such as fusarin C, than did zinc-supplemented cultures. Microscopic examination showed that zinc-deficient hyphae contained numerous lipid globules which were not present in zinc-supplemented cultures. Addition of zinc (3,200 ppb) to 2- and 4-day-old cultures inhibited further fusarin C biosynthesis but did not stimulate additional dry weight accumulation on (10.0 ppm) and cobalt (9.0 ppm) did not affect fusarin C biosynthesis or dry weight accumulation. Manganese (5.1 ppm) did not affect dry weight accumulation but did increase fusarin C biosynthesis in the absence of zinc. Maximum fusarin C levels, 32.3 microgram/mg (dry weight), were produced when cultures were supplied manganese, whereas minimum fusarin C levels, 0.7 microgram/mg (dry weight), were produced when zinc, iron, cobalt, and manganese were supplied. These results suggest a multifunctional role for zinc in affecting *F. moniliforme* metabolism. Applied and environmental microbiology. Mar 1989. v. 55 (3). p. 649-655. ill. Includes references. (NAL Call No.: DNAL 448.3 AP5).

1056

### Fungicides reduce corn drying and storage risks.

White, D.G. Shove, G.C.; Peterson, W.H. St. Joseph, Mich. : The Society. American Society of Agricultural Engineers (Microfiche collection). Paper presented at the 1988 Summer Meeting of the American Society of Agricultural Engineers. Available for purchase from: The American Society of Agricultural Engineers, Order Dept., 2950 Niles Road, St. Joseph, Michigan 49085. Telephone the Order Dept. at (616) 429-0300 for information and prices. 1988. (fiche no. 88-6075). 11 p. Includes references. (NAL Call No.: DNAL FICHE S-72).

1057

### Inhibition of 3H-leucine incorporation by trichothecene mycotoxins in maize and wheat tissue.

PHYTAJ. Casale, W.L. Hart, L.P. St. Paul, Minn. : American Phytopathological Society. The trichothecenes, deoxynivalenol (DON, vomitoxin) and T-2 toxin, inhibited 3H-leucine incorporation into acetone: ethanol insoluble material by maize and wheat tissue (leaf disks and kernel sections). These compounds are known to inhibit protein synthesis in animals and yeast. The toxin concentrations that gave ID50 (50% reduction) for 3H-leucine incorporation by

several maize varieties were 0.9 microM T-2 toxin and 9-22 microM DON. ID50 values for wheat were 0.26 microM T-2 toxin and 4.5 microM DON. T-2 toxin gave near-maximum inhibition in leaf tissue within 5 min after exposure to the toxin. T-2 toxin or its effects on 3H-leucine incorporation persisted at least 120 min after removal of leaf disks from toxin solutions. Sensitivity to DON was not correlated with susceptibility to ear rot by a DON-producing strain of *Gibberella zeae* (anamorph = *Fusarium graminearum*) for six maize lines with a range of disease reactions from highly susceptible to highly resistant. However, the ID50 for one moderately resistant line (A509) was 2.3 times greater than the ID50 of the most susceptible line (879). 3H-Leucine incorporation by wheat and maize was inhibited by DON and T-2 toxin at concentrations occurring in naturally infected tissue, suggesting the need for further evaluation of these compounds as plant disease determinants. Phytopathology. Dec 1988. v. 78 (12,pt.2). p. 1673-1677. Includes references. (NAL Call No.: DNAL 464.8 P56).

1058

### Isolation techniques for surveying the fungi of stored maize.

TKASAT. Frey, S.A. Legg, D.E. Louisville, Ky. : The Academy. Transactions of the Kentucky Academy of Science. Sept 1988. v. 49 (3/4). p. 131-139. Includes references. (NAL Call No.: DNAL 500 K41).

1059

### Measuring uniformity of coverage in auger application of fungicides.

TAAEA. Endsley, J.C. Reid, J.F.; Bode, L.E. St. Joseph, Mich. : American Society of Agricultural Engineers. Transactions of the ASAE. Nov/Dec 1989. v. 32 (6). p. 1865-1870. ill. Includes references. (NAL Call No.: DNAL 290.9 AM32T).

1060

### Microbiology of moist grains.

Pelhat, J. New York, N.Y. : Lavoisier Pub., c1988. Preservation and storage of grains, seeds, and their by-products : cereals, oilseeds, pulses, and animal feed / edited by J.L. Multon ; preface by A.M. Reimbert ; translated from French by D. Marsh ; reread by A.J. Eydt. Literature review. p. 328-346. Includes references. (NAL Call No.: DNAL SB190.C6513).

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1061

**Sitostanyl ferulate as an indicator of mechanical damage to corn kernels.**  
CECHAF. Seitz, L.M. St. Paul, Minn. : American Association of Cereal Chemists. Cereal chemistry. May/June 1990. v. 67 (3). p. 305-307. Includes references. (NAL Call No.: DNAL 59.8 C33).

1062

**Toxigenic Fusarium scirpi in maize grain from midnorthern China.**  
PHYTAJ. Hsia, C.C. Kommedahl, T.; Tziang, B.L.; Wu, J.L. St. Paul, Minn. : American Phytopathological Society. Phytopathology. July 1988. v. 78 (7). p. 978-980. ill. Includes references. (NAL Call No.: DNAL 464.8 P56).

1063

**Using ELISA kits to test corn for aflatoxin.**  
AAREEZ. Wilcke, W.F. Ehrich, M.R.; Ko, K.W. New York, N.Y. : Springer. Two brands of commercially available, enzyme linked immunosorbent assays (ELISAs) were evaluated for use in screening corn samples for aflatoxins in nonlaboratory situations (e.g., at elevators or off farms). The ELISAs were reliable aflatoxin detectors if all direction were carefully followed, but the tests indicated more aflatoxins than was actually present for up to 17% of the samples, and the tests were faster and more accurate if conducted in a laboratory by trained personnel. Applied agricultural research. Winter 1990. v. 5 (1). p. 32-36. Includes references. (NAL Call No.: DNAL S539.5.A77).

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1064

**Bioenergetics of the larger grain borer, Prostephanus truncatus (Horn) (Coleoptera: Bostrichidae), feeding on corn.**  
AESAAI. Demianyk, C.J. Sinha, R.N. College Park, Md. : The Society. Annals of the Entomological Society of America. May 1988. v. 81 (3). p. 449-459. Includes references. (NAL Call No.: DNAL 420 EN82).

1065

**Comparative effect of grain moisture on the biological activity of protectants on stored corn.**  
JEENAI. Samson, P.R. Parker, R.J.; Jones, A.L. College Park, Md. : Entomological Society of America. Abstract: Increasing moisture content of corn had the same adverse effect on biological activity of fenitrothion formulated as an emulsifiable concentrate (EC), wettable powder, or dust against *Tribolium castaneum* (Herbst). The proportion of residues of the three formulations extracted by a surface wash withmethanol was also reduced in similar proportions as moisture content increased. Among five organophosphorus compounds (all EC) tested against *T. castaneum*, fenitrothion was the most adversely affected by moisture content (14 and 18%) and chlorpyrifus-methyl the least, and all were more affected than the pyrethroid deltamethrin (EC). Against *Rhyzopertha dominica* (F.), biological activities of methacrifos and carbaryl (water-dispersed colloid) were much reduced at higher moisture content, while the activities of five pyrethrroids (EC or miscible oil) were slightly reduced. Over a greater range of moisture contents, activities of fenitrothion, chlorpyrifos-methyl, and pirimiphosmethyl agaisnt *T. castaneum* were substantially reduced only above a corresponding equilibrium relative humidity of 70-80%. No such threshold was measured for carbaryl, an increase in moisture having considerable effect on activity even when grain was quite dry. Effect of moisture on activity of deltamethrinwas significant but relatively small, particularly against *T. castaneum*. Journal of economic entomology. June 1988. v. 81 (3). p. 949-954. Includes references. (NAL Call No.: DNAL 421 J822).

1066

**Corn marketing, processing, and utilization.**  
AGRYA. Watson, S.A. Madison, Wis. : American Society of Agronomy. Agronomy. In the series analytic: Corn and Corn Improvement, Third Edition / edited by G.F. Sprague and J.W. Dudley. 1988. (18). p. 881-940. Includes references. (NAL Call No.: DNAL 4 AM392).

1067

**Detritus as a factor influencing population growth rates of three tenebrionid beetles in stored corn.**

JESCEP. Arbogast, R.T. Tifton, Ga. : Georgia Entomological Society. Journal of entomological science. Oct 1989. v. 24 (4). p. 454-459. Includes references. (NAL Call No.: DNAL QL461.G4).

1068

**Development of the granary weevil (Coleoptera: Curculionidae) on barley, corn, oats, rice and wheat.**

JEENAI. Schwartz, B.E. Burkholder, W.E. Lanham, Md. : Entomological Society of America. Granary weevil, *Sitophilus granarius* (L.), development from egg to adult emergence on barley, corn, oats, rice, and wheat was examined at 27.5 degrees C and 75% RH. Development was Slowest on corn and fastest on rice. No differences in developmental duration were observed among barley, oats, and wheat. Progeny production was highest on barley and wheat, followed by (in descending order) corn, rice, and oats. Granary weevil development from egg to adult emergence on corn was examined at 15, 20, 25, 30, and 35 degrees C, and 43, 58, or 75% RH. Development was slowest at 15 degrees C and fastest at 30 degrees C. Development was slowest at 43% RH. Few weevils emerged at 43% RH, and only one weevil emerged at 35 degrees C and 75% RH. Granary weevil development from egg to adult emergence on barley was examined at 15, 20, 25, 27.5, and 30 degrees C, and 43, 58, or 75% RH. Development was slowest at 15 degrees C for all RH values and at 43% RH for all temperatures. Journal of economic entomology. June 1991. v. 84 (3). p. 1047-1052. Includes references. (NAL Call No.: DNAL 421 J822).

1069

**Effect of several management tactics on adult mortality and progeny production of *Sitophilus zeamais* (Coleoptera: Curculionidae) on stored corn in the laboratory.**

JEENAI. Sedlacek, J.D. Barney, R.J.; Price, B.D.; Siddiqui, M. Lanham, Md. : Entomological Society of America. A factorial experiment was conducted to examine the effects of temperature, corn hybrid, moisture content of corn, malathion treatment, and presence or absence of surface-contaminating fungi on adult survival, progeny production, progeny weight, and time to 50% emergence of the maize weevil, *Sitophilus zeamais* Motschulsky. Temperature, moisture content, surface contamination, and malathion significantly influenced maize weevil mortality. Progeny production was affected by these factors as well as by the corn hybrids. Progeny weight and time to 50% emergence were affected only by temperature and moisture content. There were several highly significantly interactions, most notably between temperature and moisture content. Temperature, corn hybrid, and moisture content appear to offer the greatest potential for

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nonchemical control of maize weevil in bulk grain stores. Journal of economic entomology. June 1991. v. 84 (3). p. 1041-1046. Includes references. (NAL Call No.: DNAL 421 J822).

1070

**Effects of moisture content and initial insect density on ability of rusty grain beetles (Coleoptera: Cucujidae) to infest whole corn.**  
JESCEP. Throne, J.E. Tifton, Ga. : Georgia Entomological Society. Journal of entomological science. Jan 1990. v. 25 (1). p. 25-29. Includes references. (NAL Call No.: DNAL QL461.G4).

1071

**Effects of threshing and drying on maize weevil populations in field-infested corn.**  
JEENAI. Keever, D.W. Wiseman, B.R.; Widstrom, N.W. College Park, Md. : Entomological Society of America. Journal of economic entomology. Apr 1988. v. 81 (2). p. 727-730. Includes references. (NAL Call No.: DNAL 421 J822).

1072

**Environmental protection agency gives tentative go-ahead to test genetically engineered pesticide.**

Meyer, E.L. Washington, D.C. : The Washington Post Co. The Washington post. Mar 30, 1988. p. A18. (NAL Call No.: DNAL A00069).

1073

**Evaluation of chlorpyrifos-methyl and chlorpyrifos-methyl plus methoprene as protectants of stored corn: small bin tests.**  
JEENAI. Arthur, F.H. Throne, J.E.; Simonaitis, R.A.; Zehner, J.M. Lanham, Md. : Entomological Society of America. Chlorpyrifos-methyl applied at 6 ppm and a combination of 6 ppm chlorpyrifos-methyl + 1 ppm methoprene were evaluated as protectants of stored corn (*Zea mays L.*) against a standard malathion application of 8 ppm and an untreated control. Corn was treated in October 1987, placed in 10-, 19-, and 76-bu bins, and infested at selected intervals with red flour beetle, *Tribolium castaneum* (Herbst); flat grain beetle, *Cryptolestes pusillus* (Schonherr); maize weevil, *Sitophilus zeamais* Motschulsky; and Indianmeal moth, *Plodia interpunctella* (Hubner). Indianmeal moths did not establish populations on treated or untreated corn. Beetle populations in untreated controls were not abundant until June 1988 (8 mo after application). After 12 mo, red flour beetle and flat grain beetle populations were significantly greater in corn treated with malathion than in corn treated with either chlorpyrifos-methyl or chlorpyrifos-methyl + methoprene. Maize weevil populations were not significantly different among the three

chemical treatments. Moisture content was not significantly different between treated and untreated corn or among the chemical treatments. Dockage and weight loss were significantly greater in untreated than in treated corn after 8 mo. After 12 mo, weight loss was significantly greater in malathion-treated corn than in corn treated with either chlorpyrifos-methyl or chlorpyrifos-methyl + methoprene. Insect population levels or insect damage did not differ significantly between the latter two treatments. Journal of economic entomology. June 1990. v. 83 (3). p. 1114-1121. Includes references. (NAL Call No.: DNAL 421 J822).

1074

**Humidity and tactile responses of *Sitophilus zeamais* (Coleoptera: Curculionidae).**  
EVETEX. Weston, P.A. Hoffman, S.A. Lanham, Md. : Entomological Society of America. In laboratory choice tests, maize weevils, *Sitophilus zeamais* Motschulsky, initially preferred lower humidities when given a choice of two humidities. The absolute difference in humidities and position on the RH scale had little influence on the response. After 24 h, weevils generally were hygropositive, which suggests that starvation or desiccation or both moderated humidity preference. The same temporal response pattern was observed when weevils were given a choice of five humidities ranging from 0 to 100%. Weevils showed a pronounced preference for contact with tactile stimuli (glass beads) and apparently preferred contact with smaller beads (4 mm diameter) over larger beads (6 mm diameter). Superimposing humidity and tactile stimulus choices revealed that tactile preferences took precedence over humidity preferences. The nature of the humidity response suggests that poor feedback exists between humidity perception and atmospheric water needs. Environmental entomology. Oct 1991. v. 20 (5). p. 1433-1437. Includes references. (NAL Call No.: DNAL QL461.E532).

1075

**Inheritance of resistance in whole kernel maize to oviposition by the maize weevil (Coleoptera: Curculionidae).**  
JEENAI. Tipping, P.W. Cornelius, P.L.; Legg, D.E.; Poneleit, C.G.; Rodriguez, J.G. Lanham, Md. : Entomological Society of America. Inheritance of resistance in maize, *Zea mays L.*, to oviposition by the maize weevil, *Sitophilus zeamais* Motschulsky, was investigated by first crossing 10 inbred lines (A619, B37, B68, B73, H95, Mo17, N28, Pa91, R805, and T220) in all possible combinations (full diallel) in two environments (Florida and Kentucky). Resulting F1 seed was evaluated for resistance to the maize weevil. Remnant F1 seed was then planted, and the F2 seed was evaluated for resistance as before. A significant environmental influence occurred on the expression of resistance; maize grown in Florida was consistently more susceptible to

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maize weevil attack than that grown in Kentucky. Generally, however, the most resistant genotypes in one environment were among the most resistant in the other. Other findings indicated that general combining ability and, to a lesser extent, specific combining ability were important in the heritability of resistance to the maize weevil. A significant maternal effect occurred on resistance in the F1 but it generally was not present in the F2 seed. Conclusions are that, using these genotypes, development of hybrids with significant maize weevil resistance should be possible because the resistance factors were principally influenced by general combining ability and maternal effects were not expressed past the F1 generation. *Journal of economic entomology*. Oct 1989. v. 82 (5). p. 1466-1469. Includes references. (NAL Call No.: DNAL 421 J822).

1076

**Interaction of maize weevil (Coleoptera: Curculionidae) and parasitoid Anisopteromalus calandrae (Hymenoptera: Pteromalidae) in a small bulk of stored corn.**  
JEENAI. Arbogast, R.T. Mullen, M.A. Lanham, Md. : Entomological Society of America. Monthly samples of a stored-corn ecosystem in southeastern Georgia were used to examine interaction between the maize weevil, *Sitophilus zeamais* Motschulsky, and its parasitoid, *Anisopteromalus calandrae* (Howard). Counts of adults were made when the samples were taken. Counts were made again after the samples had been held at 30 degrees C and 60% RH for 1 wk and for 3 wk. Host and parasitoid develop within grain kernels; at any time, their numbers can be divided into interstitial and intrakernel populations. Interstitial populations, estimated by the first count, consisted of adults that were in the interstices of the grain mass when a sample was taken. In these populations, numerical response of the parasitoid to host density was clear and indicated a degree of natural control. The intrakernel populations, estimated by counts 2 and 3 combined, included immature stages and adults that had not yet emerged from grain kernels at the time of sampling. Analysis of these populations showed that the rate of parasitism responded to changes in host density, but lagged behind. This delayed density-dependence allowed enough fluctuation in the weevil population for significant damage to occur during periods of peak population density. Nevertheless, *A. calandrae* may be an effective biological control agent if it is introduced in sufficient numbers early in the storage period to suppress the initial buildup of weevil populations. For long storage periods, additional introductions would be required to prevent weevil populations from rebounding once the parasite population declined. *Journal of economic entomology*. Dec 1990. v. 83 (6). p. 2462-2468. Includes references. (NAL Call No.: DNAL 421 J822).

1077

**Malathion resistance in larvae of some southern Minnesota populations of the indianmeal moth, *Plodia interpunctella* (Lepidoptera: Pyralidae), infesting bulk-stored shelled corn.**  
GRLEA. Sumner, W.A. II. Harein, P.K.; Subramanyam, Bh. East Lansing, Mich. : Michigan Entomological Society. *The Great Lakes entomologist*. Fall 1988. v. 21 (3). p. 133-137. Includes references. (NAL Call No.: DNAL QL461.M5).

1078

**Phenotypic variants and total alpha-amylase activity in the maize weevil (Coleoptera: Curculionidae).**  
JKESA. Baker, J.E. Lum, P.T.M.; Halliday, W.R. Lawrence, Kan. : The Society. *Journal of the Kansas Entomological Society*. Oct 1989. v. 62 (4). p. 430-434. Includes references. (NAL Call No.: DNAL 420 K13).

1079

**Progeny production and duration of development of rusty grain beetles, *Cryptolestes ferrugineus* (Stephens) (Coleoptera: Cucujidae), on cracked and whole corn.**  
JESCEP. Throne, J.E. Culik, M.P. Tifton, Ga. : The Entomological Science Society. *Journal of entomological science*. Jan 1989. v. 24 (1). p. 150-155. Includes references. (NAL Call No.: DNAL QL461.G4).

1080

**Resistance of hairy fungus beetle (Coleoptera: Mycetophagidae) to pirimiphos methyl and malathion.**  
JEENAI. Weinzierl, R.A. Porter, R.P. Lanham, Md. : Entomological Society of America. Adult hairy fungus beetles, *Typhaea stecorea* (L.), were collected in Livingston County, Ill., from stored corn treated with pirimiphos methyl. When compared with a susceptible population exposed for 14 d to insecticide residues on corn in laboratory bioassays, the Livingston County population exhibited 38-fold resistance to pirimiphos methyl and 66-fold fold resistance to malathion at the LC50. This is the first report of insecticide resistance in the hairy fungus beetle. A laboratory colony of the red flour beetle, *Tribolium castaneum* (Herbst), showed resistance to malathion but not cross-resistance to pirimiphos methyl. A laboratory colony of the maize weevil, *Sitophilus zeamais* Motschulsky, was susceptible to both insecticides. *Journal of economic entomology*. Apr 1990. v. 83 (2). p. 325-328. Includes references. (NAL Call No.: DNAL 421 J822).

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1081

Rusty grain beetle (Coleoptera: Cucujidae)  
oviposition in cracked and whole corn.  
JESCEP. Throne, J.E. Tifton, Ga. : Georgia  
Entomological Society. Journal of entomological  
science. Jan 1991. v. 26 (1). p. 183-187.  
Includes references. (NAL Call No.: DNAL  
QL461.G4).

p. 127-136. Includes references. (NAL Call No.:  
DNAL SB599.J69).

1082

Seasonal abundance of maize and rice weevils  
(Coleoptera: Curculionidae) in South Carolina.  
Throne, J.E. Cline, L.D. Clemson, S.C. : South  
Carolina Entomological Society. Journal of  
agricultural entomology. Apr 1991. v. 8 (2). p.  
93-100. Includes references. (NAL Call No.:  
DNAL SB599.J69).

1086

Survival of immature rusty grain beetles  
(Coleoptera: Cucujidae) on various particle  
sizes of cracked corn.

JESCEP. Throne, J.E. Griffin, Ga. : Georgia  
Entomological Society. Journal of entomological  
science. Jan 1992. v. 27 (1). p. 65-70.  
Includes references. (NAL Call No.: DNAL  
QL461.G4).

1083

Seasonal flight activity of the maize weevil,  
*Sitophilus zeamais* Motschulsky (Coleoptera:  
Curculionidae), and the rice weevil, *S. oryzae*  
(L.), in South Carolina.  
Throne, J.E. Cline, L.D. Clemson, S.C. : South  
Carolina Entomological Society. Journal of  
agricultural entomology. July 1989. v. 6 (3).  
p. 183-192. maps. Includes references. (NAL  
Call No.: DNAL SB599.J69).

1084

Sound detection of stored-product insects that  
feed inside kernels of grain.  
JEENAI. Vick, K.W. Webb, J.C.; Weaver, B.A.;  
Litzkow, C. College Park, Md. : Entomological  
Society of America. A system for acoustically  
detecting internal-feeding insect larvae in  
grain is described. Larvae of the lesser grain  
borer, *Rhyzopertha dominica* (F.); rice weevil,  
*Sitophilus oryzae* (L.); and Angoumois grain  
moth, *Sitotroga cerealella* (Olivier), produced  
sounds loud enough to be detected 13-19 d after  
oviposition, depending upon the species. After  
first detection larvae produced detectable  
sounds 71-90% of the time until pupation.  
Infestation rates could be estimated, at least  
in the range of 1-20 infested kernels per 100  
ml of grain where the infestation rate was  
strongly correlated to number of sounds as  
counted by a frequency counter. Journal of  
economic entomology. Oct 1988. v. 81 (5). p.  
1489-1493. ill. Includes references. (NAL Call  
No.: DNAL 421 J822).

1085

Status of malathion and pirimiphos-methyl  
resistance in adults of red flour beetle and  
sawtoothed grain beetle infesting farm-stored  
corn in Minnesota.  
Subramanyam, B. Harein, P.K. Clemson, S.C. :  
South Carolina Entomological Society. Journal  
of agricultural entomology. Apr 1990. v. 7 (2).

# WEEDS

1087

## Accent.

Hageman, L. Urbana, Ill. : Cooperative Extension Service, Univ of Illinois at Urbana-Champaign, 1991 . Illinois Agricultural Pesticides Conference summaries of presentations January 8, 9, 10, 1991, Urbana, Illinois / Univ of Illinois at Urbana-Champaign, Coop Ext Serv, in coop with the Illinois Natural History Survey. "Proceedings of the 1991 Illinois Agricultural Pesticides Conference," January 8-10, 1991, Urbana, Illinois. p. 11-12. (NAL Call No.: DNAL SB950.2.I3I4).

1088

## Agronomic practices influencing triazine-resistant weed distribution in Ontario.

WETEE9. Stephenson, G.R. Dykstra, M.D.; McLaren, R.D.; Hamill, A.S. Champaign, Ill. : The Society. Weed technology : a journal of the Weed Science Society of America. Paper presented at the "Symposium on Herbicide Resistance," February 8, 1989, Dallas, Texas. Jan/Mar 1990. v. 4 (1). p. 199-207. maps. Includes references. (NAL Call No.: DNAL SB610.W39).

1089

## Alfalfa and orchardgrass control in no-till corn.

PNWSB. Hartwig, N.L. College Park, Md. : The Society. Proceedings of the annual meeting - Northeastern Weed Science Society. Meeting held January 8-10, 1991, Baltimore, Maryland. 1991. v. 45. p. 33-38. Includes references. (NAL Call No.: DNAL 79.9 N814).

1090

## Allelopathic potential of legume debris and aqueous extracts.

WEESA6. White, R.H. Worsham, A.D.; Blum, U. Champaign, Ill. : Weed Science Society of America. Cotton and pitted morningglory emergence and dry weight decreased approximately 60 to 80% when these plants were grown under greenhouse conditions in the presence of increasing amounts (0.8 to 6.7 mg debris/g soil) of field-grown crimson clover or hairy vetch debris incorporated into the soil medium. Conversely, corn dry weight increased 20 to 75% when legume debris was placed on the soil surface; incorporated debris had very little effect on corn emergence or dry weight. Germination and seedling growth of corn, Italian ryegrass, cotton, pitted morningglory, and wild mustard decreased progressively, with species-dependent variation, when exposed to increasing concentrations (8.3 to 33.3 g debris/L) of aqueous crimson clover and hairy vetch extract. Mustard and ryegrass germination and growth were almost completely inhibited by full-strength extracts of both legumes.

Bioassay species exhibited greater phytotoxic responses to hairy vetch than to crimson clover in the debris and extract studies. Emergence and growth of corn and cotton were not affected when planted into soil samples, containing root biomass and possible leaf and root exudates, collected from beneath field-grown hairy vetch and crimson clover plants. However, morningglory dry weight increased 35% in the presence of either legume root debris and accompanying soil. Weed science. Sept 1989. v. 37 (5). p. 674-679. Includes references. (NAL Call No.: DNAL 79.8 W41).

1091

## Annual weed control with selected herbicides in field corn grown in coarse-textured soil /R.N. Arnold ... et al. .

Arnold, R. N. Las Cruces, N.M. : New Mexico State University, Agricultural Experiment Station, 1990. Caption title.~ "January 1990." 5 p. ; 28 cm. Bibliography: p. 5. (NAL Call No.: DNAL 100 N465R no.643).

1092

## Application timing and corn (*Zea mays*) residue effects on weed control from metribuzin plus metolachlor.

WEESA6. Koppatschek, F.K. Liebl, R.A.; Slife, F.W. Champaign, Ill. : Weed Science Society of America. Field and laboratory studies were conducted in 1985 and 1986 to determine the effect of herbicide application timing and level of corn residue on metribuzin plus metolachlor for weed control in soybean. Herbicides were applied early preplant and preemergence, or preemergence. Giant foxtail control was better with sequential application than early preplant herbicide application in both years. Control of velvetleaf, smooth pigweed, and jimsonweed was independent of application timing, except in 1986, when jimsonweed control was less from herbicides applied early preplant compared to sequentially. Metribuzin reaching the soil was less when applied to high levels of corn residue compared to low residue levels. However, corn residue level had no effect on weed control. Weed science. May 1989. v. 37 (3). p. 345-349. Includes references. (NAL Call No.: DNAL 79.8 W41).

1093

## Assessment of leaf cover as an indicator of weed thresholds in field corn.

PNWSB. Degni, J. Hahn, R.R.; Pleasant, J.M. College Park, Md. : The Society. Proceedings of the annual meeting - Northeastern Weed Science Society. Meeting held January 6-9, 1992, Boston, Massachusetts. 1992. v. 46. p. 37-42. Includes references. (NAL Call No.: DNAL 79.9 N814).

(WEEDS)

1094

**Atrazine, bifenox, and shade effects on crownvetch (*Coronilla varia*) nodulation and nodule activity.**  
WEESA6. Cardina, J. Hartwig, N.L. Champaign, Ill. : Weed Science Society of America. Studies were conducted to determine whether photosynthesis-inhibiting herbicides atrazine or bifenox, and shade affect the number, weight senescence, and N fixation activity of nodules on the roots of the perennial legume crownvetch. Atrazine and bifenox were applied at rates of 2.24 kg ai/ha to shaded and unshaded plots. The shade was varied during the growing season to simulate changing irradiance levels beneath a corn canopy. Atrazine and bifenox treatments reduced nodule number to 13 and 42% of the untreated control, respectively, in 1980, and 18 and 35% in 1981. Shade treatments reduced nodule number to a low of 40% of the control in 1980 and 50% in 1981. Combined effects of herbicides and shade on nodule numbers were more than additive. Nodule fresh weights were reduced an average of 37% by herbicide treatments and 39% by shade treatments. Sloughed nodule numbers decreased in the herbicide and shaded treatments, suggesting that the reduction in nodule numbers was due to fewer nodules being produced. Nodule numbers were reduced a greater percentage by herbicides and shade than was herbage dry matter production. Specific nodule activity (SNA) did not differ in nodules from the atrazine, bifenox, or shade treatments on the six sampling dates in 1980 or on two treatments of three sampling dates in 1981. Nomenclature: Atrazine, 6-chloro-N-ethyl-N'-(methylethyl)-1,3,5-triazine-2,4-diamine; bifenox, methyl 5-(2,4-dichlorophenoxy)-2-nitrobenzoate; crownvetch, *Coronilla varia* L. ~ CZRVA. Weed science. July 1988. v. 36 (4). p. 535-539. Includes references. (NAL Call No.: DNAL 79.8 W41).

1095

**Atrazine metabolite behavior in soil-core microcosms: Formation, disappearance, and bound residues.**  
ACSMC. Winkelmann, D.A. Klaine, S.J. Washington, D.C. : The Society. ACS Symposium series - American Chemical Society. In the series analytic: Pesticide Transformation Products: Fate and significance in the environment / edited by L. Somasundaram and J.R. Coats. ~ Literature review. 1991. (459). p. 75-92. Includes references. (NAL Call No.: DNAL QD1.A45).

1096

**Beacon.**  
Dill, T.R. Urbana, Ill. : Cooperative Extension Service, Univ of Illinois at Urbana-Champaign, 1991 . Illinois Agricultural Pesticides Conference summaries of presentations January 8, 9, 10, 1991, Urbana, Illinois / Univ of Illinois at

Urbana-Champaign, Coop Ext Serv, in coop with the Illinois Natural History Survey.  
"Proceedings of the 1991 Illinois Agricultural Pesticides Conference," January 8-10, 1991, Urbana, Illinois. p. 13-15. (NAL Call No.: DNAL SB950.2.I3I4).

1097

**Bioengineers' quest: drought-safe plants.**  
Gladwell, M. Washington, D.C. : The Washington Post Co. The Washington post. July 23, 1990. p. A3. (NAL Call No.: DNAL A00069).

1098

**Broadleaf and green foxtail control with DPX-M6316 and primisulfuron in corn.**  
Evans, J.O. Jenks, B.M. S.I. : The Society. Research progress report - Western Society of Weed Science. Meeting held March 14-16, 1989, Honolulu, Hawaii. 1989. p. 280-281. (NAL Call No.: DNAL 79.9 W52R).

1099

**Broadleaf weed control in field corn with postemergence herbicides.**  
Arnold, R.N. Gregory, E.J.; Smeal, D. S.I. : The Society. Research progress report - Western Society of Weed Science. Meeting held March 14-16, 1989, Honolulu, Hawaii. 1989. p. 278-279. (NAL Call No.: DNAL 79.9 W52R).

1100

**Canada thistle control in field corn.**  
PNWSB. Causey, M. Webb, F. College Park, Md. : The Society. Proceedings of the annual meeting - Northeastern Weed Science Society. Includes abstract. 1990. v. 44. p. 82-83. (NAL Call No.: DNAL 79.9 N814).

1101

**Carryover effect of new soybean herbicides on corn.**  
Witt, W.W. Mills, J.A.; Schmitz, G.L. Lexington, Ky. : The Department. Soil science news & views - Cooperative Extension Service and University of Kentucky, College of Agriculture, Department of Agronomy. Apr 1988. v. 9 (4). 2 p. (NAL Call No.: DNAL S591.55.K4S64).

## (WEEDS)

1102

### Characterization of triazine-resistant giant foxtail (*Setaria faberii*) and its control in no-tillage corn (*Zea mays*).

WEESA6. Ritter, R.L. Kaufman, L.M.; Monaco, T.J.; Novitzky, W.P.; Moreland, D.E. Champaign, Ill. : Weed Science Society of America. Triazine-resistant giant foxtail was identified in 1984 near Delta, PA. In field studies conducted from 1985 to 1987, preemergence applications of atrazine with cyanazine or simazine provided poor (less than or equal to 60%) season-long control of this annual grass in no-tillage corn. Best season-long preemergence control was obtained with metolachlor or microencapsulated formulations of alachlor or EPTC. Postemergence applications of cyanazine or tridiphane + atrazine + crop oil provided poor giant foxtail control. Postdirected applications of paraquat resulted in fair (greater than or equal to 70%) control of giant foxtail through midseason. In greenhouse studies, triazine-resistant (R) giant foxtail tolerated preemergence applications of atrazine or simazine at dosages to 9.0 kg ai/ha. Triazine-sensitive (S) giant foxtail was injured by 2.2 kg/ha and higher rates of atrazine and simazine. In laboratory studies, the I<sub>50</sub> for inhibition by atrazine of photoinduced electron transport in thylakoids isolated from S and R biotypes was determined to be 0.24 and 205 micro M, respectively. The differential sensitivity was paralleled by simazine. However, the limited solubility of simazine prevented determination of an I<sub>50</sub> value with thylakoids from the R biotype. Weed science. July 1989. v. 37 (4). p. 591-595. Includes references. (NAL Call No.: DNAL 79.8 W41).

1103

### Chemical weed control in corn.

Johnson, W.C. III. Athens, Ga. : The Service. Bulletin - Cooperative Extension Service, University of Georgia, College of Agriculture. Jan 1989. (930, rev.). 11 p. (NAL Call No.: DNAL 275.29 G29B).

1104

Combinations of nonselective herbicides for difficult to control weeds in no-till corn, *Zea mays*, and soybeans, *Glycine max*. WEESA6. Wilson, J.S. Worsham, A.D. Champaign, Ill. : Weed Science Society of America. The combination of glyphosate and 2,4-D at various rates was evaluated for controlling existing weeds at planting in no-till corn and soybeans. Herbicide combinations in soybeans also included paraquat plus 2,4-D linuron, or diuron. Standard treatments included glyphosate (0.6 and 1.1 kg ae/ha) and paraquat (0.3 and 0.6 kg ai/ha), and 2,4-D (0.6 kg ae/ha) alone. For corn, the addition of 2,4-D to glyphosate did not improve weed control, although the addition of 2,4-D to paraquat did improve horseweed control. Corn yield with the herbicide combinations was higher than that for

the nonselective herbicides alone. Although initial weed control was good in soybeans, weed regrowth in all paraquat alone treatments was substantial, especially with horseweed. The addition of 2,4-D to paraquat improved control of horseweed and tall morningglory. The addition of linuron or diuron to paraquat improved horseweed and common ragweed control, whereas the addition of 2,4-D to glyphosate improved the control of tall morningglory but not the other weed species. Generally, after 4 weeks, all glyphosate treatments provided better horseweed control than all paraquat treatments. Paraquat plus either linuron or diuron and glyphosate alone or in combination with 2,4-D gave the highest soybean yields. Weed science. Sept 1988. v. 36 (5). p. 648-652. Includes references. (NAL Call No.: DNAL 79.8 W41).

1105

### Combinations of tridiphane and atrazine for panicum control in corn.

SWSPBE. Currie, R.S. Norton, K.R.; Merkle, M.G. Raleigh, N.C. : The Society. Proceedings - Southern Weed Science Society. Paper presented at the "Meeting on Environmental Legislation and its Effects on Weed Science," Jan 18/20, 1988, Tulsa, Oklahoma. 1988. v. 41. p. 95. (NAL Call No.: DNAL 79.9 S08 (P)).

1106

### Combining cultural practices and herbicides to control wild-proso millet (*Panicum miliaceum*).

WETEE9. Harvey, R.G. McNevin, G.R. Champaign, Ill. : The Society. Weed technology : a journal of the Weed Science Society of America. Paper presented at the "Symposium on Wild-Proso Millet," February 9, 1989, Dallas, Texas. Apr/June 1990. v. 4 (2). p. 433-439. Includes references. (NAL Call No.: DNAL SB610.W39).

1107

### The concept and application of the critical weed-free period.

Zimdahl, R.L. Boca Raton, Fla. : CRC Press, c1988. Weed management in agroecosystems : ecological approaches / editors, Miguel A. Altieri, Matt Lieberman. Literature review. p. 145-155. Includes references. (NAL Call No.: DNAL SB611.5.W43).

1108

### Consecutive annual applications of alachlor and metolachlor to continuous no-till corn (*Zea mays*).

WEESA6. Doub, J.P. Wilson, H.P.; Hines, T.E.; Hatzios, K.K. Champaign, Ill. : Weed Science Society of America. Abstract: Consecutive annual applications of alachlor 2-chloro-N-(2,6-diethylphenyl)-N-(methoxymethyl)acetamide and metolachlor

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2-chloro-N-(2-ethyl-6-methylphenyl)-N-(2-methoxy-1-methylethyl)acetamide were made to continuous no-till corn (*Zea mays* L. 'Pioneer 3184' in 1982 and 1983, 'Pioneer 3744' in 1984, and 'Pioneer 3378' in 1985 to 1987). In a 5-yr study, control of the dominant annual grass species, large crabgrass *Digitaria sanguinalis* (L.) Scop. ~ DIGSA, by alachlor declined to less than 50% by the fifth year. Control of large crabgrass by metolachlor remained greater than 80% throughout the study but metolachlor allowed the establishment of a greater fall *Panicum* (*Panicum dichotomiflorum* Michx. ~ PANDI) population in this and an addition 3-yr study than in chloroacetamide-free checks. In the 3-yr study in which giant foxtail (*Setaria faberii* Herrm. ~ SETFA) was dominant, annual applications of metolachlor and a microencapsulated formulation of alachlor provided better control in the second year than the emulsifiable concentrate formulation of alachlor, but formulation differences diminished in the third year. Weed science. May 1988. v. 36 (3). p. 340-344. Includes references. (NAL Call No.: DNAL 79.8 W41).

1109

**Construction of a high-clearance plot sprayer.** WETEE9. Chenault, E.W. Wiese, A.F. Champaign, Ill. : The Society. Weed technology : a journal of the Weed Science Society of America. Oct/Dec 1989. v. 3 (4). p. 659-662. ill. Includes references. (NAL Call No.: DNAL SB610.W39).

1110

**Contribution of crownvetch with and without tillage to redroot pigweed control in corn.** PNWSB. Hartwig, N.L. Loughran, J.C. College Park, Md. : The Society. Proceedings of the annual meeting - Northeastern Weed Science Society. Meeting held on January 4-6, 1989, Baltimore, Maryland. 1989. v. 43. p. 39-42. Includes references. (NAL Call No.: DNAL 79.9 N814).

1111

**Control of large crabgrass (*Digitaria sanguinalis*) and fall *Panicum* (*Panicum dichotomiflorum*) in corn (*Zea mays*) with tridiphane and atrazine combinations.** WEESA6. Bhowmik, P.C. Nandihalli, U.B. Champaign, Ill. : Weed Science Society of America. Abstract: A single application of 0.56 or 0.84 kg ai/ha tridiphane 2-(3,5-dichlorophenyl)-2-(2,2,2,-trichloroethyl)oxirane plus 2.3 kg ai/ha of atrazine 6-chloro-N-ethyl-N-(1-methylethyl)-1,3,5-triazine,-2,4-diamine at the one-to three-leaf stage controlled large crabgrass *Digitaria sanguinalis* (L.) Scop. ~ DIGSA and fall *Panicum* (*Panicum dichotomiflorum* Michx. ~ ANDI) 96% or more. A sequential application of 1.1 kg/ha of atrazine, in addition to the above single application, was required for control of the two grass species at the four- to six-leaf

stage. Application of tridiphane plus atrazine to large crabgrass and fall *Panicum* beyond the six-leaf stage was ineffective. Tridiphane at 0.75 kg/ha, applied alone, reduced the shoot dry weight of large crabgrass by 71%. The response of tridiphane and atrazine combinations at the four- to five-leaf stage of large crabgrass was additive. Weed science. May 1988. v. 36 (3). p. 359-362. Includes references. (NAL Call No.: DNAL 79.8 W41).

1112

**Control of legume cover crops in no-till corn (*Zea mays*) and cotton (*Gossypium hirsutum*).** WETEE9. White, R.H. Worsham, A.D. Champaign, Ill. : The Society. Weed technology : a journal of the Weed Science Society of America. Jan/Mar 1990. v. 4 (1). p. 57-62. Includes references. (NAL Call No.: DNAL SB610.W39).

1113

**Control of triazine-resistant smooth pigweed (*Amaranthus hybridus*) and common lambsquarters (*Chenopodium album*) in no-till corn (*Zea mays*).** WETEE9. Hagood, E.S. Jr. Champaign, Ill. : The Society. Weed technology : a journal of the Weed Science Society of America. Jan/Mar 1989. v. 3 (1). p. 136-142. Includes references. (NAL Call No.: DNAL SB610.W39).

1114

**Corn herbicide demonstration.** Wrage, L.J. Johnson, P.O. Brookings, S.D. : The Station. Plant science pamphlet - Plant Science Department, Agricultural Experiment Station, South Dakota State University. Jan 1989. (16). p. 42-43. (NAL Call No.: DNAL S541.5.S8P5).

1115

**Corn pest management in Wisconsin, 1988.** Doersch, R.E. Doll, J.D.; Wedberg, J.L.; Grau, C.R.; Worf, G.L.; Harvey, R.G.; Flashinski, R.A. Madison, Wis. : The Service. Publication - University of Wisconsin, Cooperative Extension Service. 1988. (A1684). 60 p. (NAL Call No.: DNAL S544.3.W6W53).

1116

**Corn production in alfalfa sod following no-till and plow based field preparation.** Kraill, J.M. Smith, D.M.; Miller, S.D. S.I. : The Society. Research progress report - Western Society of Weed Science. Meeting held March 14-16, 1989, Honolulu, Hawaii. 1989. 282-283. (NAL Call No.: DNAL 79.9 W52R).

## (WEEDS)

1117

### Corn, sorghum, and soybean response to irrigation in the Mississippi River alluvial plain.

CRPSAY. Heatherly, L.G. Wesley, R.A.; Elmore, C.D. Madison, Wis. : Crop Science Society of America. The most agronomically efficient use of irrigation water is for those crops that give the greatest response. In the Mississippi River alluvial plain, the primary irrigated crop is soybean *Glycine max* (L.) Merr., but the response of soybean to irrigation has not been compared to that of other crops. Irrigated and nonirrigated experiments were conducted from 1984 through 1987 on Tunica clay (clayey over loamy, montmorillonitic, nonacid, thermic Vertic Haplaquept) to determine the effect of irrigation on field-grown corn (*Zea mays* L.), sorghum *Sorghum bicolor* (L.) Moench, and soybean yield and yield components. Shifts in weed species composition resulting from continuous monocropping with these crops also were quantified. Irrigation was applied from beginning bloom to near maturity of each crop whenever soil water potential at the 30-cm soil depth averaged about -70 kPa. Irrigation did not consistently affect weed cover in any of the crops. Weed level differences among crops resulted from different weed control programs for each continuous cropping system. Differences between average seed yields of irrigated (I) and nonirrigated (NI) corn, sorghum, and soybean were 2886, 694, and 1574 kg ha<sup>-1</sup>, respectively. Sorghum produced the most stable nonirrigated yield and the smallest increase in monetary return from irrigation. Differences between I and NI corn and soybean yields were associated with increased number of seed. Smaller sorghum yield differences were associated with differences in seed weight or a combination of differences in seed weight and number of seed. Across the 4 yr, irrigation of corn and soybean produced nearly equal increases in gross income per unit of land area, but irrigation efficiency for soybean was lower because achieving the increased return from irrigation required nearly twice as much water for soybean as for corn. Crop science. May/June 1990. v. 30 (3). p. 665-672. Includes references. (NAL Call No.: DNAL 64.8 C883).

1118

### Corn tolerance to postemergence applications of DPX-V9360 and CGA-136872.

Miller, S.D. Dalrymple, A.W.; Krall, J.M. S.I. : The Society. Research progress report - Western Society of Weed Science. Meeting held March 14-16, 1989, Honolulu, Hawaii. 1989. p. 294-295. (NAL Call No.: DNAL 79.9 W52R).

1119

### Corn (*Zea mays*) tolerance and weed control with thiameturon.

WETEE9. Eberlein, C.V. Miller, T.L. Champaign, Ill. : The Society. Weed technology : a journal of the Weed Science Society of America. Apr/June 1989. v. 3 (2). p. 255-260. Includes

references. (NAL Call No.: DNAL SB610.W39).

1120

**Cover crop and herbicide influence on row crop seedling establishment in no-tillage culture.**  
WEESA6. Weston, L.A. Champaign, Ill. : Weed Science Society of America. The establishment and management of nine cover crops in Kentucky production systems were evaluated in field experiments over a 2-yr period. 'Wheeler' rye, 'Barsoy' barley, and 'Tyler' wheat cereal grains produced greater biomass (180 to 260 g/m<sup>2</sup>) than the pasture species tall fescue, creeping red fescue, and white clover (55 to 110 g/m<sup>2</sup>). 'Kentucky 31' tall fescue, creeping red fescue, and white clover proved most difficult to control, and significant regrowth occurred regardless of herbicide or rate applied. HOE-39866 (1.7 kg ai/ha) was effective in rapidly controlling all cover crops except tall fescue by 30 days after application. Sethoxydim and fluazifop (0.4 and 0.3 kg ai/ha, respectively) effectively controlled the cereals and two ryegrass species. Glyphosate applied at 1.1 and 2.2 kg ai/ha was also effective, while 0.6 kg ai/ha controlled only cereal grain growth adequately. After chemical control, pasture grass plots contained fewest weeds/m<sup>2</sup> with some reductions likely due to density and regrowth of the sods. Cover crops were effective in suppressing weed growth at 45 days after chemical control. However, significant weed growth existed in all cover crop plots by 60 days after kill. Row crop establishment increased linearly with increasing glyphosate rate. Cereal grain covers provided the most compatible planting situations for greatest seedling establishment, with rye and wheat providing greatest weed suppression. Generally, increased weed suppression provided by a cover crop was accompanied by reduced row crop establishment, with greatest reductions observed in pasture grass plots. Cucumber was most easily established while snap pea was most difficult. Weed science. Mar 1990. v. 38 (2). p. 166-171. Includes references. (NAL Call No.: DNAL 79.8 W41).

1121

### Demonstration of weed management practices for improved energy management and reduced potential for water contamination.

Hartzler, R. Van Kooten, B. Ames, Iowa : The Service. PM - Iowa State University, Cooperative Extension Service. In the series analytic: Integrated Farm Management Demonstration Program. 1990 Progress Report. Jan 1991. (1417). p. 85-88. (NAL Call No.: DNAL 275.29 IO9PA).

(WEEDS)

1122

Differential tolerance of corn genotypes to DPX-M6316.

WEESA6. Eberlein, C.V. Rosow, K.M.; Gadelmann, J.L.; Openshaw, S.J. Champaign, Ill. : Weed Science Society of America. Ten corn inbred lines were field evaluated for their tolerance to DPX-M6316 at 32 and 64 g ai/ha. Inbreds 'A619', 'A641', and 'ND246' were highly susceptible to DPX-M6316; inbreds 'A671', 'A632', and 'B73' were highly tolerant; and inbreds 'A654', 'CM105', 'W153R', and 'M107' were intermediate in their response. The basis for differential tolerance was studied by comparing the susceptibility of acetolactate synthase (ALS) to inhibition by DPX-M6316 in tolerant A671 and susceptible A619, and by examining the absorption, translocation, and metabolism of DPX-M6316 in both genotypes. I(50) values for DPX-M6316 inhibition of ALS activity in extracts from etiololated shoots of A671 and A619 were similar, 15.6 and 17.4 nM, respectively. There was little difference in <sup>14</sup>C-DPX-M6316 absorption by the two inbreds, but twice as much of the absorbed <sup>14</sup>C was translocated out of the treated leaf of A619 (13%) compared to A671 (6%). Differences in translocation may have been due to much more rapid DPX-M6316 metabolism in A671 than in A619. Extracts from treated leaves of A671 had only 23% DPX-M6316 remaining 5.5 h after treatment (HAT) compared to 78% DPX-M6316 remaining in extracts from A619 leaves.

Therefore, rate of metabolism was the major factor involved in the tolerance of A671 and the susceptibility of A619 to DPX-M6316. Weed science. Sept 1989. v. 37 (5). p. 651-657. Includes references. (NAL Call No.: DNAL 79.8 W41).

1123

Directed sprayer for no-tillage weed control.

Morrison, J.E. Jr. Brown, S.M. Washington, D.C. : The Service. Reprints - U.S. Department of Agriculture, Agricultural Research Service. 1988. 221 . p. 90-92. ill. Includes references. (NAL Call No.: DNAL aS21.A8U5/ARS).

1124

Distribution of triazine-resistant smooth pigweed (*Amaranthus hybridus*) and common lambsquarters (*Chenopodium album*) in Virginia. WEESA6. Vencill, W.K. Foy, C.L. Champaign, Ill. : Weed Science Society of America. The distribution pattern of s-triazine-resistant biotypes of common lambsquarters (*Chenopodium album* L. ~ CHEAL) and smooth pigweed (*Amaranthus hybridus* L. ~ AMACH) in Virginia was determined. Seeds were collected from suspected triazine-resistant biotypes of both species. Triazine resistance was confirmed by measuring chlorophyll fluorescence in the presence of atrazine

6-chloro-N-ethyl-N'-(1-methylethyl)-1,3,5-triazine-2,4-diamine. Greenhouse bioassay with whole-plant material and a sinking leaf disc assay were also performed as further

confirmation of triazine resistance.

Triazine-resistant smooth pigweed was confirmed in 19 counties and common lambsquarters in eight counties in Virginia. Trazine-resistant smooth pigweed and common lambsquarters were located mostly in the northern and southwestern highlands of the state where there has been a long history of triazine use in no-till corn (*Zea mays* L.) production. S-triazine-resistant biotypes were also cross-resistant to other representative s-triazine and a-triazine herbicides but susceptible to the substituted urea herbicide diuron

N'-(3,4-dichlorophenyl)-N,N-dimethylurea. Weed science. July 1988. v. 36 (4). p. 497-499. Includes references. (NAL Call No.: DNAL 79.8 W41).

1125

DPX-V9360--selective johnsongrass control for California corn.

WSWPA. Cook, J.F. Steele, W.J.; Pacheco, J.L.; Mitch, L.W.; Orr, J.P. Reno, Nev. : The Society. Proceedings - Western Society of Weed Science. Meeting held on March 13-16, 1989, Honolulu, Hawaii. 1989. v. 42. p. 52-56. (NAL Call No.: DNAL 79.9 W52).

1126

Early preplant and preemergence weed control programs for no-till corn production.

PNWSP. Webb, F.J. Johnson, Q.R. College Park, Md. : The Society. Proceedings of the annual meeting - Northeastern Weed Science Society. Meeting held January, 6-8, 1988, Hartford, Connecticut. 1988. v. 42 (suppl.). p. 23-24. (NAL Call No.: DNAL 79.9 N814).

1127

Early preplant herbicide applications in corn.

Miller, S.D. Ball, D.A.; Dalrymple, A.W. S.I. : The Society. Research progress report - Western Society of Weed Science. Meeting held March 14-16, 1989, Honolulu, Hawaii. 1989. p. 284-285. (NAL Call No.: DNAL 79.9 W52R).

1128

Early preplant herbicide applications in corn.

Miller, S.D. Krall, J.M.; Fornstrom, K.J. S.I. : The Society. Research progress report - Western Society of Weed Science. 1988. p. 240-241. (NAL Call No.: DNAL 79.9 W52R).

## (WEEDS)

1129

### Economic analysis of four weed management systems.

WEESA6. Lybecker, D.W. Schweizer, E.E.; King, R.P. Champaign, Ill. : Weed Science Society of America. An economic analysis of four weed management systems employed on four crop sequences in a barley-corn-pinto bean-sugarbeet rotation in eastern Colorado was computed. Weeds were controlled in each crop with only conventional tillage or conventional tillage plus minimum levels of herbicide (systems 3 and 4), moderate levels of herbicides (system 1), or intensive levels of herbicides (system 2). Adjusted gross returns were higher for systems 3 and 4 where herbicide use was less/year and decreased over 4 yr than for systems 1 and 2 where herbicide use was higher/year and constant. When the four crop sequences were aggregated using yield and sucrose indices, the least herbicide-intensive weed management system had \$440/ha/4 yr higher indexed adjusted gross return than the most herbicide-intensive weed management system. An income risk analysis showed that the herbicide-intensive weed management system was not risk efficient and that producers would select one of the other three less herbicide-intensive weed management systems depending upon their risk preferences. *Weed science*. Nov 1988. v. 36 (6). p. 846-849. Includes references. (NAL Call No.: DNAL 79.8 W41).

1130

### Economic analysis of Texas panicum control programs in corn.

SWSPBE. Johnson, W.C. III. Bullock, D.G. Raleigh, N.C. : The Society. Proceedings - Southern Weed Science Society. Paper presented at the "Meeting on Environmental Legislation and Its Effects on Weed Science," Jan 18/20, 1988, Tulsa, Oklahoma. 1988. v. 41. p. 94. (NAL Call No.: DNAL 79.9 S08 (P)).

1131

**Economies of herbicide use on corn (*Zea mays*) and soybeans (*Glycine max*) in Ontario.**  
WETEE9. Stemmeroff, M. Swanton, C.J.; Hamill, A.S.; Brown, R.H. Champaign, Ill. : The Society. *Weed technology* : a journal of the Weed Science Society of America. Oct 1988. v. 2 (4). p. 466-472. Includes references. (NAL Call No.: DNAL SB610.W39).

1132

### Effect of application timing on rhizome johnsongrass (*Sorghum halepense*) control with DPX-V9360.

WEESA6. Obrigawitch, T.T. Kenyon, W.H.; Kuratle, H. Champaign, Ill. : Weed Science Society of America. Field, greenhouse, and laboratory studies were conducted to examine the effect of application timing on the activity of DPX-V9360 on rhizome johnsongrass.

Field and greenhouse studies indicated that johnsongrass treated with postemergence applications of DPX-V9360 at late growth stages (>5 leaves) was controlled more effectively than when treated in early growth stages (<5 leaves). Johnsongrass control was optimized with split-postemergence applications (treatments applied at early and late growth stages) in field studies compared to a single postemergence application at either early or late growth stages. The pattern of translocation of 2-14C (pyrimidine)-labeled DPX-V9360 applied to a fully expanded johnsongrass leaf did not differ significantly between three different growth stages of 10-, 30-, and 60-cm height. Over 60% of the absorbed 14C remained in the treated leaf. Most of the translocated 14C moved out of the treated leaf within 3 days after application and distributed to the shoot in greater quantities than to the rhizomes. About 40% of 14C-DPX-V9360 applied to the leaf surfaces of a tolerant species (corn) or susceptible species (johnsongrass) was absorbed into the leaf. Corn metabolized over 90% of absorbed DPX-V9360 within 20 h, while there was no perceptible metabolism of DPX-V9360 V9360 in johnsongrass leaves after 24 h. Late growth stage and split-postemergence applications appear to provide more effective control than early growth stage applications because of better control of regrowth (new shoot emergence from rhizomes after application) and because tillering and plant emergence are more nearly complete at application time. *Weed science*. Jan 1990. v. 38 (1). p. 45-49. Includes references. (NAL Call No.: DNAL 79.8 W41).

1133

### The effect of sethoxydim on corn (*Zea mays*) and giant foxtail (*Setaria faberii*).

WEESA6. Chernicky, J.P. Gast, R.; Slife, F.W. Champaign, Ill. : Weed Science Society of America. Corn and giant foxtail response to foliar-applied sethoxydim at 67, 134, and 200 g ai/ha was evaluated in field studies. Sethoxydim applied over the top of corn (60 cm tall) caused greater whorl damage and reduced corn grain yield more than postdirected sethoxydim. Sethoxydim controlled giant foxtail best when used in conjunction with a preemergence application of metolachlor (2.2 kg/ha) and atrazine (1.7 kg/ha). *Weed science*. July 1989. v. 37 (4). p. 600-603. Includes references. (NAL Call No.: DNAL 79.8 W41).

1134

### Effects of ammonium fertilizers and BCH 81508 S on antagonism with sethoxydim plus bentazon mixtures.

WETEE9. Jordon, D.L. York, A.C. Champaign, Ill. : The Society. *Weed technology* : a journal of the Weed Science Society of America. July/Sept 1989. v. 3 (3). p. 450-454. Includes references. (NAL Call No.: DNAL SB610.W39).

1135

**Effects of CGA-154281 and temperature on metolachlor absorption and metabolism, glutathione content, and glutathione-S-transferase activity in corn (*Zea mays*).**

WEESA6. Viger, P.R. Eberlein, C.V.; Fuerst, E.P.; Gronwald, J.W. Champaign, Ill. : Weed Science Society of America. CGA-154281 and temperature effects on metolachlor absorption and metabolism were studied in corn seedlings grown in untreated soil or soil treated with metolachlor, CGA-154281, or both. Seedlings were grown under a cool (21/13 C, 16-h day) or warm (30/21 C, 16-h day) temperature regime and exposed to <sup>14</sup>C-metolachlor for 10 min at either 21 or 30 C. Corn grown under the cool temperature regime absorbed slightly more <sup>14</sup>C-metolachlor than corn grown under the warm temperature regime. Corn held at 21 C during a 10-min <sup>14</sup>C-metolachlor exposure period metabolized metolachlor more slowly than corn held at 30 C. Decreased corn tolerance to metolachlor observed at lower temperatures may be due in part to slower metolachlor metabolism. Corn grown in the presence of metolachlor plus CGA-154281 metabolized <sup>14</sup>C-metolachlor to the glutathione conjugate twice as fast as corn grown in the presence of metolachlor alone. The increase in metabolism rate was due to a fivefold increase in glutathione-S-transferase (GST, EC 2.5.1.18) activity and not to an increase in glutathione (GSH) content. Results are consistent with the hypothesis that CGA-154281 protects corn from metolachlor injury by enhancing GST activity, which accelerates metolachlor detoxification via GSH conjugation. Weed science. July/Sept 1991. v. 39 (3). p. 324-328. Includes references. (NAL Call No.: DNAL 79.8 W41).

1136

**Effects of herbicides on weeds in field corn grown on coarse-textured soils.**

AAREEZ. Arnold, R.N. Gregory, E.U.; Smeal, D. New York : Springer. Applied agricultural research. 1988. v. 3 (1). p. 21-23. Includes references. (NAL Call No.: DNAL S539.5.A77).

1137

**Effects of (NH<sub>4</sub>)<sub>2</sub>SO<sub>4</sub> and BCH 81508 S on efficacy of sethoxydim.**

WETEE9. York, A.C. Jordan, D.L.; Wilcut, J.W. Champaign, Ill. : The Society. Weed technology : a journal of the Weed Science Society of America. Jan/Mar 1990. v. 4 (1). p. 76-80. Includes references. (NAL Call No.: DNAL SB610.W39).

1138

**Effects of tillage on the efficacy and persistence of clomazone in soybean (*Glycine max*).**

WEESA6. Mills, J.A. Witt, W.W.; Barrett, M. Champaign, Ill. : Weed Science Society of America. Experiments were conducted in 1985 to 1987 to evaluate the effects of conventional and no-tillage systems on the weed control provided by clomazone applied pre-emergence in soybeans. The persistence of clomazone in soil of the two tillage systems was also determined. Increasing the clomazone rate from 0.8 to 1.4 kg/ha did not increase weed control. Clomazone controlled 80% or more of jimsonweed, velvetleaf, and giant foxtail. Common cocklebur control ranged from about 50 to 70% in no-till and from 80 to 90% in conventional tillage. Generally, soybean pods/plant and yields were lower from clomazone treatments than from handweeded treatments due to inadequate common cocklebur control. Over 40% of the clomazone applied did not reach the soil surface; it was either intercepted by wheat straw, volatilized, or both. Clomazone persisted longer in conventional tillage than in no-tillage in 1985. However, in 1986, clomazone was equally persistent in the two tillage systems. The half-life of clomazone was 34 and 6 days in 1985 in conventional and no-tillage, respectively, and in 1986, 18 and 16 days in conventional and no-tillage, respectively. Significant clomazone concentrations were not found below 10 cm in the soil profile. Corn planted without tillage (no-till) approximately 1 yr after clomazone application was not injured and yields were not reduced due to prior clomazone use. Weed science. Mar 1989. v. 37 (2). p. 217-222. Includes references. (NAL Call No.: DNAL 79.8 W41).

1139

**Effects of tillage on trifluralin residue carryover injury to corn (*Zea mays*).**

WEESA6. Hartzler, R.G. Fawcett, R.S.; Owen, M.D.K. Champaign, Ill. : Weed Science Society of America. Trifluralin was evaluated at 1.1, 2.2, and 4.5 kg/ha in 1983 and 1984 at two locations in Iowa for residue carryover injury to corn the following seasons. Three methods of seedbed preparation (no-till, moldboard, and chisel plowing) for corn planting were also examined. There was no effect on corn growth at the 1.1 kg/ha rate of trifluralin. Averaged over the four experiments, reductions in corn height of 8 and 24% were observed 5 weeks after planting at 2.2 and 4.5 kg/ha, respectively. The relative degree of stunting due to trifluralin decreased as the growing season progressed. Early-season carryover injury was more severe in reduced tillage than in moldboard plow treatments in the 1983-1984 Nashua experiment. Moldboard and chisel plowing reduced the concentration of trifluralin in the 0- to 7.5-cm zone of the soil profile by 62 and 31%, respectively, when compared to no-till. No yield reductions were observed at the 1.1 or 2.2 kg/ha rate of trifluralin. In 1984, grain yields were reduced by 8 and 16% at Ames and Nashua, respectively, by the 4.5 kg/ha

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trifluralin rate. *Weed science*. July 1989. v. 37 (4). p. 609-615. Includes references. (NAL Call No.: DNAL 79.8 W4f).

**1140**

**Efficacy of selected herbicides as influenced by soil properties.**

WETEE9. Blumhorst, M.R. Weber, J.B.; Swain, L.R. Champaign, Ill. : The Society. *Weed technology : a journal of the Weed Science Society of America*. Apr/June 1990. v. 4 (2). p. 279-283. Includes references. (NAL Call No.: DNAL SB610.W39).

**1141**

**Enhanced soil degradation of butylate and EPTC in Nebraska fields.**

WETEE9. Roeth, F.W. Wilson, R.G.; Martin, A.R.; Shea, P.J. Champaign, Ill. : The Society. *Weed technology : a journal of the Weed Science Society of America*. Jan/Mar 1989. v. 3 (1). p. 24-29. Includes references. (NAL Call No.: DNAL SB610.W39).

**1142**

**Evaluation of postemergence herbicide treatments in corn.**

Miller, S.D. Dalrymple, A.W.; Krall, J.M. S.I. : The Society. Research progress report - Western Society of Weed Science. Meeting held March 14-16, 1989, Honolulu, Hawaii. 1989. p. 292-293. (NAL Call No.: DNAL 79.9 W52R).

**1143**

**Evaluation of postemergence herbicide treatments in corn.**

Miller, S.D. Krall, J.M. S.I. : The Society. Research progress report - Western Society of Weed Science. 1988. p. 238-239. (NAL Call No.: DNAL 79.9 W52R).

**1144**

**Evaluation of postemergence herbicide treatments in field corn.**

Mitich, L.W. Smith, N.L. Kyser, G.B. S.I. : The Society. Research progress report - Western Society of Weed Science. 1988. p. 246-247. (NAL Call No.: DNAL 79.9 W52R).

**1145**

**Evaluation of postemergence herbicides on field corn.**

Kidder, D.W. Drummond, D.P. S.I. : The Society. Research progress report - Western Society of Weed Science. 1988. p. 234-235. (NAL Call No.: DNAL 79.9 W52R).

**1146**

**Evaluation of preemergence or complementary preemergence/postemergence treatments in corn.**

Miller, S.D. Dalrymple, A.W.; Krall, J.M. S.I. : The Society. Research progress report - Western Society of Weed Science. Meeting held March 14-16, 1989, Honolulu, Hawaii. 1989. p. 290-291. (NAL Call No.: DNAL 79.9 W52R).

**1147**

**Evaluation of preemergence or complementary preemergence/postemergence treatments in corn.**

Miller, S.D. Krall, J.M.; Fornstrom, K.J. S.I. : The Society. Research progress report - Western Society of Weed Science. 1988. p. 242-243. (NAL Call No.: DNAL 79.9 W52R).

**1148**

**Evaluation of preplant incorporated herbicides in corn.**

Miller, S.D. Krall, J.M.; Fornstrom, K.J. S.I. : The Society. Research progress report - Western Society of Weed Science. 1988. p. 244-245. (NAL Call No.: DNAL 79.9 W52R).

**1149**

**Evaluation of preplant incorporated, postemergence, and sequential herbicide treatments in field corn.**

Mitich, L.W. Smith, N.L. S.I. : The Society. Research progress report - Western Society of Weed Science. Meeting held March 14-16, 1989, Honolulu, Hawaii. 1989. p. 296-297. (NAL Call No.: DNAL 79.9 W52R).

**1150**

**Evaluation of the mechanism of action of the bleaching herbicide Sc-0051 by HPLC analysis.**

PCPB. Mayonado, D.J. Hatzios, K.K.; Orcutt, D.M.; Wilson, H.P. Duluth, Minn. : Academic Press. *Pesticide biochemistry and physiology*. Oct 1989. v. 35 (2). p. 138-145. Includes references. (NAL Call No.: DNAL SB951.P49).

**1151**

**Factors affecting the activity of thifensulfuron.**

WEESA6. Zhao, C.C. Teasdale, J.R.; Coffman, C.B. Champaign, Ill. : Weed Science Society of America. The influence of various factors on the tolerance of corn and selected weed species to thifensulfuron was studied in greenhouse experiments. Corn fresh weight was reduced by postemergence application of thifensulfuron when applied at 180 g ai ha<sup>-1</sup> without surfactant or at 18 g ha<sup>-1</sup> with a nonionic surfactant. Corn was more susceptible to root exposure whereas velvetleaf was more

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susceptible to foliar exposure. Velvetleaf was most susceptible when plants were young, when a nonionic surfactant was added, and at 20 rather than 30 C. Simulated rainfall 8 h after application reduced velvetleaf injury by thifensulfuron at 18 g ha<sup>-1</sup> without surfactant; however, with addition of a nonionic surfactant, velvetleaf injury was reduced only if rainfall occurred less than 2 h after application. Soil moisture level did not affect velvetleaf susceptibility. Weed science. Nov 1990. v. 38 (6). p. 553-557. Includes references. (NAL Call No.: DNAL 79.8 W41).

1152

**Field bioassays of enhanced EPTC degradation.** ORDCB. Bendixen, L.E. Nandihi11, U.B. Wooster, Ohio : The Center. Special circular - Ohio Agricultural Research and Development Center. June 1989. (125). p. 46-51. Includes references. (NAL Call No.: DNAL 100 OH3S).

1153

**Field competition study with field corn and barnyardgrass.** Mitich, L.W. Smith, N.L.; Kyser, G.B. S.I. : The Society. Research progress report - Western Society of Weed Science. 1988. p. 248. (NAL Call No.: DNAL 79.9 W52R).

1154

**Glyphosate as harvest aid for corn (*Zea mays*).** WETEE9. Alcantara, E.N. Wyse, D.L. Champaign, Ill. : The Society. Weed technology : a journal of the Weed Science Society of America. Oct 1988. v. 2 (4). p. 410-413. Includes references. (NAL Call No.: DNAL SB610.W39).

1155

**Grass control in corn with accent and beacon.** Witt, W.W. Slack, C.H.; Martin, J.R.; Green, J.D.; Thompson, M.A. Lexington, Ky. : The Service. Agronomy notes - University of Kentucky, College of Agriculture, Cooperative Extension Service. May 1991. v. 24 (4). 8 p. (NAL Call No.: DNAL S596.7.A47).

1156

**Grass control in corn with several new herbicides.** Westra, P. D'Amato, T. S.I. : The Society. Research progress report - Western Society of Weed Science. Meeting held March 14-16, 1989, Honolulu, Hawaii. 1989. p. 300. (NAL Call No.: DNAL 79.9 W52R).

1157

**Herbicide evaluations--1990--Dean Lee Research Station, Alexandria, LA.** Virdine, P.R. Girlinghouse, J.M. Baton Rouge, La. : The Station. LAES mimeo series - Louisiana Agricultural Experiment Station. 1990. (53). 139 p. (NAL Call No.: DNAL S541.5.L8L34).

1158

**Herbicide performance.** Wrage, L.J. Brookings, S.D. : The Department. Field facts : soils, insects, diseases, weeds, crops - South Dakota State University, Cooperative Extension, Plant Science Department. Jan 18, 1988. v. 2 (26). p. 3-4. (NAL Call No.: DNAL S596.7.F44).

1159

**Host status of five weed species and their effects on *Pratylenchus zeae* infestation of maize.**

JONEB. Jordaan, E.M. De Waele, D. Raleigh, N.C. : Society of Nematologists. Journal of nematology. Oct 1988. v. 20 (4). p. 620-624. Includes references. (NAL Call No.: DNAL QL391.N4J62).

1160

**Influence of a crownvetch living mulch and previous crop on corn yields in a dry year.** PNWSB. Hartwig, N.L. College Park, Md. : The Society. Proceedings of the annual meeting - Northeastern Weed Science Society. 1990. v. 44. p. 89-92. Includes references. (NAL Call No.: DNAL 79.9 N814).

1161

**Influence of a crownvetch living mulch on dandelion invasion in corn.** PNWSB. Hartwig, N.L. College Park, Md. : The Society. Proceedings of the annual meeting - Northeastern Weed Science Society. Meeting held on January 4-6, 1989, Baltimore, Maryland. 1989. v. 43. p. 25-28. Includes references. (NAL Call No.: DNAL 79.9 N814).

1162

**Influence of atomizers upon efficacy of tridiphane plus atrazine applied postemergence.** WETEE9. Reed, J.P. Hall, F.R.; Reichard, D.L. Champaign, Ill. : The Society. Weed technology : a journal of the Weed Science Society of America. Jan/Mar 1990. v. 4 (1). p. 92-96. Includes references. (NAL Call No.: DNAL SB610.W39).

## (WEEDS)

1163

**The influence of herbicide formulation on weed control in four tillage systems.**  
WEESA6. Johnson, M.D. Wyse, D.L.; Lueschen, W.E. Champaign, Ill. : Weed Science Society of America. The objectives of this research were to compare the weed control efficacy of liquid, granular, and microencapsulated formulations of preemergence herbicides in moldboard plow, chisel plow, ridge tillage, and no-tillage corn and soybean production systems, and to determine whether herbicide formulation can influence herbicide interception and retention on surface corn residue. Common lambsquarters populations were threefold higher in corn than in soybeans. A mixed population of giant foxtail and green foxtail was highest in the chisel plow and lowest in the ridge tillage system as were total weed numbers. Percent weed control was not influenced by tillage when considered across all herbicide treatments. Weed control was not influenced by herbicide formulation in the moldboard plow, chisel plow, or ridge tillage systems, but granular herbicide applications provided better weed control than liquid applications in the no-tillage system and across various rates of corn residue in an experiment with no tillage variables. Two- to threefold less granular-applied herbicide was intercepted by surface corn residue at the time of application compared to liquid-applied herbicide. Increasing amounts of postapplication rainfall decreased the difference among formulations with regard to both total soil reception of the herbicide and resultant weed control. There was no consistent advantage for the microencapsulated formulation over the other herbicide formulations. Surface corn residue controlled many weeds without the aid of a herbicide and actually contributed to overall weed control even where herbicides were applied. This suggests that the binding of preemergence herbicides on surface crop residue may not be the cause of weed control failures in reduced-tillage systems as is often assumed to be the case. *Weed science*. Mar 1989. v. 37 (2). p. 239-249. Includes references. (NAL Call No.: DNAL 79.8 W41).

1164

**Influence of soil texture, soil moisture, organic cover, and weeds on oviposition preference of southern corn rootworm (*Coleoptera: Chrysomelidae*).**  
EVETEX. Brust, G.E. House, G.J. Lanham, Md. : Entomological Society of America. Oviposition preferences of the southern corn rootworm, *Diabrotica undecimpunctata howardi* Barber, were investigated in greenhouse experiments where abiotic and biotic parameters were manipulated. Southern corn rootworm oviposition distance from corn seedlings was quantified. Four soil moistures, four soil textures, and the presence of weeds were examined in caged greenhouse experiments for their effect on southern corn rootworm oviposition preference. Additional experiments were conducted to elucidate southern corn rootworm oviposition preference for corn seedlings in the presence of broadleaf

weeds, grass weeds, a wheat straw cover, or bare soil in large-cage experiments in the greenhouse. Southern corn rootworm adults oviposited > 90% of their eggs within 3 cm of a corn stem with <1% oviposited 10-15 cm from the plant. Soil moisture and texture significantly affected oviposition preference. Moist or wet soil and dark soils (moderately high in organic matter and clay) were preferred for oviposition. Significant interactions occurred between these two variables. The presence of weeds significantly increased the number of eggs oviposited and influenced the oviposition preference for particular soil moistures and textures. Southern corn rootworm adults preferred to feed on and oviposit in areas that contained broadleaf weeds compared with grass weeds, wheatstraw, or bare soil. The presence of a wheatstraw cover was significantly ( $P < 0.05$ ) preferred to bare soil. We discuss how this study elucidates a number of seemingly contradictory field observations of southern corn rootworm infestations. *Environmental entomology*. Aug 1990. v. 19 (4). p. 966-971. ill. Includes references. (NAL Call No.: DNAL QL461.E532).

1165

**Influence of tillage systems on annual weed densities and control in solid-seeded soybean (*Glycine max*).**  
WEESA6. Buhler, D.D. Oplinger, E.S. Champaign, Ill. : Weed Science Society of America. Field research was conducted at Arlington, WI, and Janesville, WI, in 1986 and 1987 to evaluate the effect of conventional-tillage, chisel plow, and no-till systems on the density and control of annual weed species in solid-seeded soybean. Common lambsquarters densities were not greatly influenced by tillage systems, but redroot pigweed densities were generally highest in the chisel plow system. Conventional tillage always had greater velvetleaf densities than no-till and no-till always had greater giant foxtail densities than conventional tillage. Giant foxtail and redroot pigweed became more difficult to control when tillage was reduced, while velvetleaf became less of a problem. This response was not observed with all herbicide treatments evaluated and several herbicide treatments provided excellent weed control. Soybean yield was not affected by tillage systems under weed-free conditions and differences in soybean yield appeared to be due to differences in weed control. *Weed science*. Mar 1990. v. 38 (2). p. 158-165. Includes references. (NAL Call No.: DNAL 79.8 W41).

1166

**Influence of tillage systems on giant foxtail, *Setaria faberii*, and velvetleaf, *Abutilon theophrasti*, density and control in corn, *Zea mays*.**  
WEESA6. Buhler, D.D. Daniel, T.C. Champaign, Ill. : Weed Science Society of America. Giant foxtail density in corn was greater under no-till and chisel plow tillage systems than conventional or till plant. Giant foxtail

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density in no-till was 1400 shoots/m<sup>2</sup> 56 days after corn planting compared to 170 under conventional tillage. Velvetleaf density was greater under conventional tillage than all other tillage systems. Velvetleaf density was 120 plants/m<sup>2</sup> 56 days after corn planting under conventional tillage compared to 20 in no-till. Control of giant foxtail was often less under no-till or chisel plow conditions than conventional or till plant with the same herbicide treatment. Giant foxtail control with metolachlor treatments was affected less by tillage than similar treatments containing alachlor. Velvetleaf control was less with conventional tillage than other tillage systems when less than 1.7 kg/ha of atrazine was applied. Corn injury was not influenced by tillage systems. Corn yield was not affected by tillage systems under weed-free conditions. Several herbicide treatments resulted in corn yield similar to the weed-free under conventional tillage, but no herbicide treatment produced corn yield similar to the weed-free control under no-till conditions. Weed science. Sept 1988. v. 36 (5). p. 642-647. Includes references. (NAL Call No.: DNAL 79.8 W41).

1167

Influence of weeds in corn plantings on population densities of and damage by second-generation *Ostrinia nubilalis* (Hubner) (Lepidoptera: Pyralidae) larvae.

EVETEX. Pavuk, D.M. Stinner, B.R. Lanham, Md. : Entomological Society of America. In a 2-yr study, population densities of and damage by second-generation European corn borer, *Ostrinia nubilalis* (Hubner), larvae were compared among corn plantings containing or lacking different weed communities. Treatments were corn without weeds, corn principally with broadleaves, corn principally with grasses, and corn with a mixture of broadleaves and grasses. In both years, larval density (number of larvae per corn plant) and damage (number of tunnels per corn plant) were significantly lower in treatments with broadleaves than in treatments without broadleaves. Larval density was significantly lower in treatments with grasses than in treatments without grasses in 1989. The broadleaf X grass interaction was significant for larval density in 1989, and significant for damage in both years. Although natural enemies of *O. nubilalis* may be more abundant and effective in weedy corn, the presence of weeds, particularly grasses, attracts adult moths to cornfields, which may result in larger infestations of corn and greater damage. In addition, weeds may harbor other pests of corn and compete with corn for nutrients and water, leading to reduced yields. Environmental entomology. Feb 1991. v. 20 (1). p. 276-281. Includes references. (NAL Call No.: DNAL QL461.E532).

1168

Interference of four annual weeds in corn (*Zea mays*).

WEESAG. Beckett, T.H. Stoller, E.W.; Wax, L.M. Champaign, Ill. : Weed Science Society of America. Season-long interference of shattercane, giant foxtail, common cocklebur, and common lambsquarters in corn was evaluated in the field at weed densities from 0.4 to 13.1 plants or clumps/m of corn row during 1985, 1986, and 1987. Corn seed yields decreased linearly with increases in the density of clumps of 2 to 3 shattercane plants and 5 to 8 giant foxtail plants, reaching 22% yield loss at 6.6 shattercane clumps/m of row and 18% yield loss at 13.1 giant foxtail clumps/m of row. Increases in common cocklebur density caused corn yields to decrease curvilinearly in 1985 with a maximum predicted yield loss of 27% occurring at a density of 4.7 common cocklebur plants/m of row. In 1986 and 1987, yields decreased linearly as common cocklebur density increased to 6.6 plants/m of row, where a 10% yield loss was observed. Common lambsquarters reduced corn yields only in 1985. In this year, yields decreased curvilinearly with increasing weed density, resulting in a maximum yield loss of 12% at 4.9 common lambsquarters plants/m of row. Corn yields averaged 11600 kg/ha when grown without weed interference in these experiments. Weed science. Nov 1988. v. 36 (6). p. 764-769. Includes references. (NAL Call No.: DNAL 79.8 W41).

1169

Johnsongrass control in corn by postemergence-applied herbicides.

GARB. Mueller, T.C. Bridges, D.C.; Banks, P.A. Athens, Ga. : The Stations. Research bulletin - University of Georgia, Agricultural Experiment Stations. June 1990. (392). 7 p. Includes references. (NAL Call No.: DNAL S51.E2).

1170

Johnsongrass control in field corn.

Orr, J.P. S.I. : The Society. Research progress report - Western Society of Weed Science. Meeting held March 14-16, 1989, Honolulu, Hawaii. 1989. p. 298-299. (NAL Call No.: DNAL 79.9 W52R).

1171

Late preemergence, early postemergence corn herbicides.

Wrage, L.J. Brookings, S.D. : The Department. Field facts : soils, insects, diseases, weeds, crops - South Dakota State University, Cooperative Extension Service, Plant Science Department. May 27, 1988. v. 3 (10). p. 3-4. (NAL Call No.: DNAL S596.7.F44).

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1172

### Long-term tillage effects of seed banks in three Ohio soils.

WEESA6. Cardina, J. Regnier, E.; Harrison, K. Champaign, Ill. : Weed Science Society of America. Soils from long-term tillage plots at three locations in Ohio were sampled to determine composition and size of weed seed banks following 25 yr of continuous no-tillage, minimum-tillage, or conventional-tillage corn production. The same herbicide was applied across tillage treatments within each year and an untreated permanent grass sod was sampled for comparison. Seed numbers to a 15-cm depth were highest in the no-tillage treatment in the Crosby silt loam (77 800 m<sup>-2</sup>) and Wooster silt loam (8400 m<sup>-2</sup>) soils and in the grass sod (7400 m<sup>-2</sup>) in a Hoytville silty clay loam soil. Lowest seed numbers were found in conventional-tillage plots in the Wooster soil (400 m<sup>-2</sup>) and in minimum-tillage plots in the Crosby (2200 m<sup>-2</sup>) and Hoytville (400 m<sup>-2</sup>) soils. Concentration of seeds decreased with depth but the effect of tillage on seed depth was not consistent among soil types. Number of weed species was highest in permanent grass sod (10 to 18) and decreased as soil disturbance increased; weed populations were lowest in conventional tillage in the Hoytville soil. Common lambsquarters, pigweeds, and fall panicum were the most commonly found seeds in all soils. Diversity indices indicated that increased soil disturbance resulted in a decrease in species diversity. Weed populations the summer following soil sampling included common lambsquarters, pigweeds, fall panicum, and several species not detected in the seed bank. Weed science. Apr/June 1991. v. 39 (2). p. 186-194. Includes references. (NAL Call No.: DNAL 79.8 W41).

1173

### Long-term weed management in conservation tillage corn with SC0051.

PNWSB. Coffman, C.B. Frank, J.R. College Park, Md. : The Society. Proceedings of the annual meeting - Northeastern Weed Science Society. Includes abstract. 1990. v. 44. p. 80. (NAL Call No.: DNAL 79.9 N814).

1174

### Mechanism of clomazone selectivity in corn (*Zea mays*), soybean (*Glycine max*), smooth pigweed (*Amaranthus hybridus*), and velvetleaf (*Abutilon theophrasti*).

WEESA6. Liebl, R.A. Norman, M.A. Champaign, Ill. : Weed Science Society of America. Based on chlorophyll content, hydroponically cultured soybean seedlings were 254, 66, and 13 times more tolerant to clomazone than velvetleaf, corn, and smooth pigweed, respectively. Clomazone, at concentrations that inhibited chlorophyll, did not affect fresh weight accumulations of any species except velvetleaf. However, in velvetleaf, fresh weight accumulation was only half as sensitive to clomazone as the leaf chlorophyll content.

Uptake of <sup>14</sup>C-clomazone from nutrient solution by 72 h after treatment (HAT) (pigweed > velvetleaf > soybean > corn) indicates that differential absorption cannot account for selectivity. Shoot:root ratios of <sup>14</sup>C recovered from soybean, corn, velvetleaf, and pigweed by 72 HAT were 0.39, 0.84, 1.67, and 2.37, respectively. The limited acropetal clomazone translocation in soybean seedlings may account to a small degree for soybean tolerance to clomazone. Conversion of clomazone to more polar metabolites was rapid in all four species. There were no significant differences among species in the percentage of <sup>14</sup>C activity recovered as clomazone from root tissue by 72 HAT. Of the <sup>14</sup>C activity recovered from shoots of soybean, corn, pigweed, and velvetleaf seedlings by 72 HAT, 46, 59, 35, and 54%, respectively, was clomazone. Differences in clomazone uptake, distribution, and metabolism among the four species were either insignificant or poorly correlated to selectivity, and therefore cannot account for the tremendous differences in clomazone sensitivity among these species. These observations indicate, indirectly, that differences at the site of action may account for selectivity. Weed science. July/Sept 1991. v. 39 (3). p. 329-332. Includes references. (NAL Call No.: DNAL 79.8 W41).

1175

### Modeling the effect of shattercane on corn growth and yield.

AAEPC. Retta, A. Vanderlip, R.L.; Moshier, L.J.; Machtmes, K.; Higgins, R.A. St. Joseph, Mich. : The Society. Paper - American Society of Agricultural Engineers. Paper written for presentation at the 1989 International Summer Meeting American Society of Agricultural Engineering and the Canadian Society of Agricultural Engineering, June 25-28, 1989, Quebec Canada. Summer 1989. (89-4041). 8 p. Includes references. (NAL Call No.: DNAL 290.9 AM32P).

1176

### More prepackaged herbicide mixtures for field corn.

Hahn, R. Batavia, N.Y. : Agricultural Div. of Coop Extension, Four Western Plain Counties, N.Y. State. Ag impact. Apr 1988. v. 15 (4). p. 5. ill. (NAL Call No.: DNAL S544.3.N7A45).

1177

### Morphological responses of crop and weed species of different growth forms to ultraviolet-B radiation.

AJBOAA. Barnes, P.W. Flint, S.D.; Caldwell, M.M. Columbus, Ohio : Botanical Society of America. American journal of botany. Oct 1990. v. 77 (10). p. 1354-1360. Includes references. (NAL Call No.: DNAL 450 AM36).

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1178

### New help for shattercane and johnsongrass control in corn.

Kapusta, G. Urbana, Ill. : Cooperative Extension Service, Univ of Illinois at Urbana-Champaign, 1991. Illinois Agricultural Pesticides Conference summaries of presentations January 8, 9, 10, 1991, Urbana, Illinois / Univ of Illinois at Urbana-Champaign, Coop Ext Serv, in coop with the Illinois Natural History Survey. "Proceedings of the 1991 Illinois Agricultural Pesticides Conference," January 8-10, 1991, Urbana, Illinois. p. 1-10. (NAL Call No.: DNAL SB950.2.I3I4).

1179

### No-till corn production in a living mulch system.

WETEE9. Echtenkamp, G.W. Moomaw, R.S. Champaign, Ill. : The Society. Weed technology : a journal of the Weed Science Society of America. Apr/June 1989. v. 3 (2). p. 261-266. Includes references. (NAL Call No.: DNAL SB610.W39).

1180

### Not in corn fields: foxtail.

SDFHA. Brookings, S.D. : The Station. South Dakota farm & home research - South Dakota, Agricultural Experiment Station. Fall 1990. v. 41 (2). p. 22-25. (NAL Call No.: DNAL 100 S082S).

1181

### On-farm composting of lake weeds.

BCYCDK. Spencer, B. Emmaus, Pa. : J.G. Press. BioCycle. May/June 1988. v. 29 (5). p. 54-55. ill. (NAL Call No.: DNAL 57.8 C734).

1182

### The pathogenicity, virulence, and biocontrol potential of two Bipolaris species on johnsongrass (*Sorghum halepense*).

WEESA6. Winder, R.S. Van Dyke, C.G. Champaign, Ill. : Weed Science Society of America. Bipolaris sorghicola (isolate BS1) and an unidentified Bipolaris species (isolate BX1) were isolated from johnsongrass in North Carolina. Inoculum of BX1 was mass produced in solid and liquid cultures, whereas inoculum of BS1 could only be produced in solid cultures. When six formulations of inoculum of BX1 were compared, vegetable oil was the best adjuvant. Isolate BX1 displayed some host specificity in pathogenicity tests. In the greenhouse, isolate BS1 was more virulent on johnsongrass than isolate BX1. In growth chambers, increasing conidium concentration and younger plant ages interacted to increase virulence of BX1, as did interactions between inoculation, johnsongrass

density, and low soil fertility. In Raleigh, NC, isolate BX1 caused very little damage in the field, with or without pretreatment with metolachlor. In Greenville, MS, isolate BX1 caused significant (52%) mortality to annual johnsongrass with very little damage to corn or grain sorghum. The biocontrol potential of the two organisms is uncertain. Weed science. Jan 1990. v. 38 (1). p. 89-94. Includes references. (NAL Call No.: DNAL 79.8 W41).

1183

### Perennial vine competition and control.

MAEBB. Elmore, C.D. Heatherly, L.G.; Wesley, R.A. Mississippi State, Miss. : The Station. Bulletin - Mississippi Agricultural and Forestry Experiment Station. Oct 1989. (964). 6 p. ill. Includes references. (NAL Call No.: DNAL S79.E3).

1184

### Perennial vine control in multiple cropping systems on a clay soil.

WETEE9. Elmore, C.D. Heatherly, L.G.; Wesley, R.A. Champaign, Ill. : The Society. Weed technology : a journal of the Weed Science Society of America. Apr/June 1989. v. 3 (2). p. 282-287. Includes references. (NAL Call No.: DNAL SB610.W39).

1185

### Potential biological control agents for goosegrass (*Eleusine indica*).

WEESA6. Figlioli, S.S. Camper, N.D.; Ridings, W.H. Champaign, Ill. : Weed Science Society of America. Two leaf-spotting pathogens, Bipolaris setariae (Saw.) and Piricularia grisea (Cke.) Sacc., were isolated from severely infected goosegrass plants. Pathogenicity tests conducted at 28 C showed that both fungi were 100% effective in infecting goosegrass when given a 72-h dew period. Dew period temperature and duration requirements were tested by inoculating 2-week-old plants with conidial suspensions of each fungus and incubating them in dew chambers (100% relative humidity). Disease index increased as dew period duration increased for both fungi and at all temperatures tested. Infection occurred at all temperatures with an optimum of 24 to 28 C for B. setariae and 28 C for P. grisea. In host range tests, representative plants of the Fabaceae, Malvaceae, Poaceae, and Solanaceae were inoculated with suspensions of either 20000 or 60000 spores/ml of each fungus and placed in growth chambers at 28 C. Infection was limited to members of the Poaceae. Sorghum, showed a hypersensitive response to B. setariae. Both cultivars of corn developed light symptoms in response to both fungi at 20000 and 60000 spores/ml. Weed science. Nov 1988. v. 36 (6). p. 830-835. Includes references. (NAL Call No.: DNAL 79.8 W41).

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1186

The potential economic impact of herbicide-resistant corn in the USA.

JPRAEN. Tauer, L.W. Love, J. Madison, Wis. : American Society of Agronomy. Journal of production agriculture. July/Sept 1989. v. 2 (3). p. 202-207. Includes references. (NAL Call No.: DNAL S539.5.J68).

1187

Relationship between weed communities in corn and infestation and damage by the stalk borer (Lepidoptera: Noctuidae).

JESCEP. Pavuk, D.M. Stinner, B.R. Tifton, Ga. : Georgia Entomological Society. Journal of entomological science. Apr 1991. v. 26 (2). p. 253-260. Includes references. (NAL Call No.: DNAL QL461.G4).

1188

"Relay-planting" from alfalfa to cotton, blackeyes or silage corn.

WSWPA. Kempen, H.M. Muner, D.; Gonzalez, M.P. Reno, Nev. : The Society. Proceedings - Western Society of Weed Science. Meeting held March 12-14, 1991, Seattle Washington. 1991. b v. 44. p. 103-108. (NAL Call No.: DNAL 79.9 W52).

1189

Response of corn (*Zea mays*), soybean (*Glycine max*), and several weed species to dark-applied photodynamic herbicide modulators.

WEESA6. Mayasich, J.M. Mayasich, S.A.; Rebeiz, C.A. Champaign, Ill. : Weed Science Society of America. The photodynamic herbicidal performance of delta-aminolevulinic acid in combination with four chlorophyll biosynthesis modulators was evaluated under greenhouse conditions, using corn, soybean, and ten weed species. Treatments resulted in accumulation of various amounts of protoporphyrin IX and of monovinyl and divinyl Mg-protoporphyrin IX and protochlorophyllide. Accumulation of these tetrapyrroles was accompanied by various degrees of photodynamic injury, depending on treatment, plant species, and somewhat the modulator. The lower photodynamic susceptibility of dark monovinyl/light monovinyl and dark divinyl/light divinyl plants toward the accumulation of monovinyl and divinyl protochlorophyllide, respectively, was attributed to their greater abilities to metabolize these protochlorophyllides in the light. On the other hand, the higher photodynamic susceptibility of the dark monovinyl/light divinyl weed species toward the accumulation of monovinyl protochlorophyllide was attributed to their lower ability to metabolize the accumulated monovinyl protochlorophyllide in the light. Weed science. Jan 1990. v. 38 (1). p. 10-15. Includes references. (NAL Call No.: DNAL 79.8 W41).

1190

Response of rotational crops to soybean herbicides.

SWSBPE. Monks, C.D. Banks, P.A. Raleigh, N.C. : The Society. Proceedings - Southern Weed Science Society. Paper presented at the "Meeting on Environmental Legislation and its Effects on Weed Science," Jan 18/20, 1988, Tulsa, Oklahoma. 1988. v. 41. p. 47. (NAL Call No.: DNAL 79.9 S08 (P)).

1191

Response of weed to tillage and cover crop residue.

WEESA6. Teasdale, J.R. Beste, C.E.; Potts, W.E. Champaign, Ill. : Weed Science Society of America. Total weed density increased after 1 yr of no-tillage and after 2 yr of conventional tillage in a 4-yr experiment with repeated assignment of the same treatment to the same plots. Large crabgrass, goosegrass, and carpetweed densities were higher in the no-tillage compared with the conventional-tillage treatment in at least 1 yr whereas common lambsquarters density was greater in the conventional-tillage treatment the last year of the experiment. Within the no-tillage treatment, rye or hairy vetch residue reduced total weed density an average of 78% compared to the treatment without cover crop when cover crop biomass exceeded 300 g m<sup>-2</sup> and when residue covered more than 90% of the soil. Goosegrass, stinkgrass, and carpetweed densities were reduced by cover crop residue in at least 1 yr whereas large crabgrass was unaffected. Common lambsquarters density increased where rye was grown as a cover crop prior to conventional tillage. Despite differences in weed density among treatments, weed biomass was equivalent in all. Weed science. Apr/June 1991. v. 39 (2). p. 195-199. Includes references. (NAL Call No.: DNAL 79.8 W41).

1192

Rotation and continuous use of dietholate, fonofos, and SC-0058 on EPTC persistence in soil.

WEESA6. Bean, B.W. Roeth, F.W.; Martin, A.R.; Wilson, R.G. Champaign, Ill. : Weed Science Society of America. Field and laboratory studies were conducted to examine the influence of continuous use and rotation of extenders on EPTC persistence in soils from Clay Center and Scottsbluff, NE. Rotation of EPTC + dietholate and EPTC + fonofos in soils with three prior annual treatments of each combination did not improve weed control compared to continuous use. SC-0058 was generally effective in slowing EPTC biodegradation in soils previously treated with EPTC, EPTC + dietholate, EPTC + fonofos, or EPTC + SC-0058. Dietholate was effective in slowing EPTC biodegradation in soil previously treated with EPTC or EPTC + SC-0058. SC-0058 appeared to have an inhibitory influence on the initial development of soil-enhanced EPTC biodegradation. Any enhanced biodegradation of

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dietholate or SC-0058 that may occur after repeated use was not a factor in enhanced EPTC degradation in EPTC + extender history soils. Weed science. Mar 1990. v. 38 (2). p. 179-185. Includes references. (NAL Call No.: DNAL 79.8 W41).

1193

**Seasonal emergence and growth of Sorghum alnum.**  
WETEE9. Eberlein, C.V. Miller, T.L.; Lurvey, E.L. Champaign, Ill. : The Society. Weed technology : a journal of the Weed Science Society of America. July 1988. v. 2 (3). p. 275-281. Includes references. (NAL Call No.: DNAL SB610.W39).

1194

**Selectivity and mode of action of the postemergence herbicide diclofop-methyl.**  
Shimabukuro, R.H. New Brunswick, N.J. : Plant Growth Regulator Society of America. Quarterly - PGRSA. Apr/June 1990. v. 18 (2). p. 37-54. Includes references. (NAL Call No.: DNAL QK745.P55).

1195

**Successful weed controls create new weed problems in field corn.**  
Hahn, R.R. Canton, N.Y. : Agricultural Division, St. Lawrence County Cooperative Extension Association. St. Lawrence County agricultural news. May 1991. v. 75 (5). p. 6-7. (NAL Call No.: DNAL S544.3.N7S3).

1196

**Suitability of corn growth models for incorporation of weed and insect stresses.**  
AGUOAT. Retta, A. Vanderlip, R.L.; Higgins, R.A.; Moshier, L.J.; Feyerherm, A.M. Madison, Wis. : American Society of Agronomy. Shattercane Sorghum bicolor (L.) Moench and second generation European corn borer (ECB) *Ostrinia nubilalis* (Hubner) are pests that singly or in combination reduce corn (*Zea maize* L.) production in the northcentral regions of the USA. Shattercane reduces corn growth and yield because it competes effectively with corn for light and water. Second generation ECB larvae, in tunneling through the vascular system, apparently affect yield by disrupting water and photosynthate movements. Pest models may be linked to physiological models for assessing the effects of pest stresses on corn growth and yield. CERES-Maize and CORNF corn growth models were chosen to test accuracy and consistency in predicting corn growth and yield parameters. The objectives were to evaluate corn growth models to which pest models could be attached and to test the sensitivity of the selected model to variations in light and water. Simulated leaf area index; vegetative, grain, and total biomass; and yield components

were compared to measured data. CERES-Maize modified for leaf growth and phenology computations (VO/SAT) gave more accurate predictions of date of silking (bias = 1 d) than CORNF (bias = 6 d) or original version CERES-Maize (bias = -5 d). Accurate estimation of phenology is important because the severity of yield reduction from ECB infestation is dependent on the stage of growth. Sensitivity of VO/SAT to reductions in light and water inputs was tested by simulating combinations of light and water levels ranging from 50 to 100% of actual. A 50% reduction in light resulted in average reductions of 26% in yield, 16% in kernel weight, 16% in kernel number, and 20% in leaf area index. Similarly, a 50% reduction in precipitation resulted in average reductions of 47% in yield, 51% in kernel weight, 1% in kernel number, and 1% in leaf area index. The combination model showed adequate sensitivity to light and water, and thus could be modified to mimic weed competition. Agronomy journal. July/Aug 1991. v. 83 (4). p. 757-765. Includes references. (NAL Call No.: DNAL 4 AM34P).

1197

**Synthesis and herbicidal activity of 1-aryl-5-halo-and 1-aryl-5-(trifluoromethyl)-1H-pyrazole-4-carboxamides.**  
JAFCAU. Waldrep, T.W. Beck, J.R.; Lynch, M.P.; Wright, F.L. Washington, D.C. : American Chemical Society. A series of 1-aryl-5-halo-and 1-aryl-5-(trifluoromethyl)-1H-pyrazole-4-carboxamides exhibit moderate to strong herbicidal activity in preemergence and postemergence tests. At 1/2 lb/acre, corn, rice, wheat, cotton, and soybean show tolerance, while large crabgrass, foxtail millet, common lambsquarters, redroot pigweed, wild mustard, velvetleaf, jimsonweed, and zinnia were killed or severely injured. A total of 83 5-halo analogues and 47 5-trifluoromethyl analogues were synthesized and their herbicidal activities determined in order to examine the structure-activity relationships. The order of activity at C-5 of the pyrazole ring was CF<sub>3</sub> > Cl approximately equal to Br > I. The order of activity involving substitution on the carboxamide moiety was cyclopropyl approximately equal to methyl > dimethyl > ethyl > isopropyl. Substitution on the benzene ring did not result in any major increase in activity when compared with the corresponding phenyl analogue. Journal of agricultural and food chemistry. Feb 1990. v. 38 (2). p. 541-544. Includes references. (NAL Call No.: DNAL 381 J8223).

1198

**Synthesis and herbicidal properties of substituted 1,4-dihydro-1,2,4-benzotriazines.**  
JAFCAU. Waldrep, T.W. Rieder, B.J.; Thibault, T.D.; Canada, E.J. Washington, D.C. : American Chemical Society. A series of 1,4-dihydro-1,2,4-benzotriazines exhibits slight to moderate herbicidal activity in

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preemergence and postemergence tests. Postemergence applications of these benzotriazines at 4 lb/acre provided good control of large crabgrass, foxtail millet, redroot pigweed, wild mustard, and tomato, but no selectivity was observed among the various plant species. At 4 lb/acre preemergence, corn, wheat, rice, cotton, and soybean show tolerance, while large crabgrass, foxtail millet, redroot pigweed, common lambsquarters, velvetleaf, and jimsonweed were killed or severely injured. A total of 36 analogues was synthesized, and their herbicidal activities were determined to examine the structure-activity relationships. In general, we found that, among the variations investigated, cyano substitution on the benzo portion, small alkyl at the 1-position, and hydrogens at the 3- and 4-positions led to the most active herbicides. *Journal of agricultural and food chemistry*. Feb 1991. v. 39 (2). p. 392-395. Includes references. (NAL Call No.: DNAL 381 J8223).

### 1199

**Systems approach to weed management in irrigated crops.**  
WEESA6. Schweizer, E.E. Lybecker, D.W.; Zimdahl, R.L. Champaign, Ill. : Weed Science Society of America. The impact of four weed management systems on weed seed reserves in soil, yearly weed problem, and production of barley, corn, pinto bean, and sugarbeet was assessed where these crops were grown in rotation for 4 consecutive years in four cropping sequences. Weeds were controlled in each crop with only conventional tillage or conventional tillage plus minimum, moderate (system 1), and intensive (system 2) levels of herbicides. Seed of annual weeds from 11 genera were identified, with barynyardgrass and redroot pigweed comprising 66 and 19%, respectively, of the initial 90 million weed seed/ha present in the upper 25 cm of the soil profile. After the fourth cropping year, overall decline in the total number of weed seed in soil was 53% when averaged over four cropping sequences and four weed management systems. Over the 4-yr period, about 10 times more weeds escaped control in system 1 than in system 2; and within a crop, the fewest number of weeds escaped control annually in barley. System 2 had the higher herbicide use in each cropping sequence, the fewest weeds at harvest, and the smallest adjusted gross return over the 4-yr period in three of four cropping sequences. *Weed science*. Nov 1988. v. 36 (6). p. 840-845. Includes references. (NAL Call No.: DNAL 79.8 W41).

### 1200

**Techniques for applying postemergence herbicides.**  
Bode, L. Wolf, R. Urbana, Ill. : Cooperative Extension Service, Univ of Illinois at Urbana-Champaign, 1991 . Illinois Agricultural Pesticides Conference summaries of presentations January 8, 9, 10, 1991, Urbana,

Illinois / Univ of Illinois at Urbana-Champaign, Coop Ext Serv, in coop with the Illinois Natural History Survey. "Proceedings of the 1991 Illinois Agricultural Pesticides Conference," January 8-10, 1991, Urbana, Illinois. p. 18-21. (NAL Call No.: DNAL SB950.2.I3I4).

### 1201

**Thidiazuron effects on Malvaceae, corn, Zea mays; and soybean, Glycine max.**  
WETEE9. Hodgson, R.H. Snyder, R.H. Champaign, Ill. : The Society. *Weed technology : a journal of the Weed Science Society of America*. July 1988. v. 2 (3). p. 342-349. Includes references. (NAL Call No.: DNAL SB610.W39).

### 1202

**Tolerance of corn (Zea mays) to Sethoxydim applied with precision postemergence-directed sprayer equipment.**  
WETEE9. Kleppe, C.D. Harvey, R.G. Champaign, Ill. : The Society. *Weed technology : a journal of the Weed Science Society of America*. Oct/Dec 1989. v. 3 (4). p. 663-667. ill. Includes references. (NAL Call No.: DNAL SB610.W39).

### 1203

**Tolerance of corn (Zea mays) lines to clomazone.**  
WEESA6. Keifer, D.W. Champaign, Ill. : Weed Science Society of America. Corn hybrids and inbreds were ranked for their relative tolerance to soil-incorporated clomazone, as assessed by the level of discoloration injury in the greenhouse. Inbred W117 was the most tolerant corn line tested. Some corn lines were affected similarly by clomazone. Inbred A619 was in the most susceptible group. Clomazone injury to A619 (susceptible) and W117 (tolerant) corn was similar when the clomazone rate was 10-fold greater on W117 than on A619. The distribution of corn lines on a sensitivity scale was of limited range; the distribution of hybrids on this scale was a single symmetrical peak. Changing the growth temperature or soil composition would change the absolute level of corn injury caused by a rate of clomazone but did not change the relative ranking of the corn lines in the test. A subset of the greenhouse-tested corn lines also was evaluated in several field locations. The tolerance of corn in a given field was highly ( $P$  less than 0.005) correlated with tolerance in the greenhouse; however, the absolute levels of injury differed among locations. The tolerance of hybrids of known pedigree was highly ( $P$  less than 0.0002) correlated with the tolerance of the parent inbreds, indicating this trait was inherited. *Weed science*. July 1989. v. 37 (4). p. 622-628. Includes references. (NAL Call No.: DNAL 79.8 W41).

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1204

### Triazine resistant pigweeds in Kentucky corn fields.

Green, J.D. Barrett, M.; Radford, M. Lexington, Ky. : The Service. Agronomy notes - University of Kentucky, College of Agriculture, Cooperative Extension Service. Aug 1990. v. 23 (7). 5 p. maps. (NAL Call No.: DNAL S596.7.A47).

1205

### Use of winter wheat (*Triticum aestivum*) cultivars and herbicides in aiding weed control in an ecofallow corn (*Zea mays*) rotation.

WEESA6. Ramsel, R.E. Wicks, G.A. Champaign, Ill. : Weed Science Society of America. Abstract: An experiment involving six winter wheat (*Triticum aestivum* L.) cultivars, an early-April herbicide application on wheat and on four dates after wheat harvest, and the growth of a subsequently planted corn (*Zea mays* L.) crop was conducted at North Platte, NE. 'Centurk 78' suppressed barnyardgrass

*Echinochloa crus-galli* (L.) Beauv. ~ ECHCG more than 'Bennett' and 'Eagle' in the growing wheat and after wheat harvest in July, but there were no differences in weed yield among cultivars in corn planted 11 months later. Herbicides applied to the tilling wheat in early April improved weed control in wheat and the subsequent corn crop. Also, herbicides were applied 5, 25, 45, and 300 days after wheat harvest. Weed growth increased and soil water decreased as spraying dates were delayed. Herbicides applied 5 days after harvest did not maintain adequate weed control in the corn planted 11 months after wheat harvest and low corn yield resulted. Plots receiving herbicides 300 days after wheat harvest had the least soil water in the fall after wheat harvest but the best weed control in corn and highest corn yields because of better weed control in corn. Weed science. May 1988. v. 36 (3). p. 394-398. Includes references. (NAL Call No.: DNAL 79.8 W41).

1206

### Vegetation management and corn growth and yield in untilled mixed-species perennial sod.

AGJOAT. Buhler, D.D. Mercurio, J.C. Madison, Wis. : American Society of Agronomy. Agronomy journal. May/June 1988. v. 80 (3). p. 454-462. Includes references. (NAL Call No.: DNAL 4 AM34P).

1207

### Velvetleaf (*Abutilon theophrasti*) growth and development in conventional and no-tillage corn (*Zea mays*).

WEESA6. Defelice, M.S. Witt, W.W.; Barrett, M. Champaign, Ill. : Weed Science Society of America. Monoculture velvetleaf had greater dry weight, growth rate, leaf area index, and height than velvetleaf grown in association

with conventional or no-tillage corn. Velvetleaf planted 5 weeks after corn had significantly lower dry weight, leaf area index, and height compared to velvetleaf planted at the same time as corn. The combination of interference from corn and delayed planting caused a significant reduction in velvetleaf population at the end of the season, delayed the date of 50% velvetleaf flowering, increased the number of days required for 50% flowering, and reduced the number of capsules per plant. Velvetleaf dry weight/hectare and leaf area index increased as plant population increased. Velvetleaf dry weight, leaf area, capsules, and seed/plant decreased as plant density increased. There were no differences in vegetative or reproductive growth between velvetleaf grown in conventional or no-tillage area. Weed science. Sept 1988. v. 36 (5). p. 609-615. Includes references. (NAL Call No.: DNAL 79.8 W41).

1208

### Velvetleaf control in field corn.

PNWSB. Hahn, R.R. College Park, Md. : The Society. Proceedings of the annual meeting - Northeastern Weed Science Society. Meeting held on January 4-6, 1989, Baltimore, Maryland. 1989. v. 43. p. i2-13. (NAL Call No.: DNAL 79.9 N814).

1209

### Weed control.

Wrage, L.J. Johnson, P.O.; Vos, D.A.; Wagner, S.A. Brookings, S.D. : The Station. Plant science pamphlet - Plant Science Department, Agricultural Experiment Station, South Dakota State University. Feb 1992. (64). p. 27-35. (NAL Call No.: DNAL S54i.5.S8P5).

1210

### Weed control by subterranean clover used as a living mulch.

Enache, A.J. Ilnicki, R.D. Madison, Wis. : The Department. Progress report, clovers and special purpose legumes research - University of Wisconsin, Department of Agronomy. 1988. v. 21. p. 53. Includes references. (NAL Call No.: DNAL SB193.P72).

1211

### Weed control guide for Ohio field crops contents.

OSSBA. Loux, M.M. Harrison, S.K. Columbus, Ohio : The Service. Bulletin - Ohio State University, Cooperative Extension Service. 1988. (789). 46 p. (NAL Call No.: DNAL 275.29 OH32).

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1212

Weed control in corn.

DeGoyer, D. Belmont, N.Y. : Cooperative Extension Association of Allegany County. News and views. May 1989. v. 74 (5). p. 7. (NAL Call No.: DNAL S544.3.N7N45).

1213

Weed control in corn.

BAESD. Whitson, T.D. Miller, S.D. Laramie, Wyo. : The Service. Bulletin - Wyoming University, Cooperative Extension Service. In subseries: Wyoming weed control series. Apr 1989. (442.5). 8 p. (NAL Call No.: DNAL 275.29 W99B).

1214

Weed control in corn with new experimental herbicides.

PNWSB. Katz, F.E. Ilnicki, R.D.; Enache, A. College Park, Md. : The Society. Proceedings of the annual meeting - Northeastern Weed Science Society. Meeting held January 6, 7 & 8, 1988 in Hartford, Connecticut. 1988. v. 42. p. 3-5. (NAL Call No.: DNAL 79.9 N814).

1215

Weed control in corn (*Zea mays*) as affected by till-plant systems and herbicides.

WETEE9. Schweizer, E.E. Zimdahl, R.L.; Mickelson, R.H. Champaign, Ill. : The Society. Weed technology : a journal of the Weed Science Society of America. Jan/Mar 1989. v. 3 (1). p. 162-165. Includes references. (NAL Call No.: DNAL SB610.W39).

1216

Weed control in field corn using post directed paraquat.

PNWSB. Grant, Y.A. Webb, F.; Causey, M. College Park, Md. : The Society. Proceedings of the annual meeting - Northeastern Weed Science Society. Includes abstract. 1990. v. 44. p. 16-17. (NAL Call No.: DNAL 79.9 N814).

1217

Weed control in field corn with complementary preemergence/postemergence herbicides.

Arnold, R.N. Gregory, E.J.; Smeal, D. S.I. : The Society. Research progress report - Western Society of Weed Science. Meeting held March 14-16, 1989, Honolulu, Hawaii. 1989. p. 276-277. (NAL Call No.: DNAL 79.9 W52R).

1218

Weed control investigations in corn, cotton, sorghum and rice, 1989 /G. Euel Coats ... et al. .

Coats, G. Euel\_1938-. Mississippi State : Division of Agriculture, Forestry, and Veterinary Medicine, Dept. of Information Services, 1990 . "February 1990". iv, 144 p. : ill. ; 28 cm. (NAL Call No.: DNAL S79.E34 no.158).

1219

The weed flora of Prince Edward Island cereal fields.

WEESA6. Thomas, A.G. Ivany, J.A. Champaign, Ill. : Weed Science Society of America. Field surveys were conducted during 1978 and 1979 to determine the abundance and distribution of weeds in fields seeded to barley, oats, spring wheat, and mixtures of barley and oats in various proportions in the province of Prince Edward Island. Using a stratified random sampling procedure, weeds were counted in 536 fields during the 2-yr survey period. The weed flora had a large number of species that occurred at high densities, probably due to the limited herbicide use on Prince Edward Island. The average total number of species (64), number of species per field (20), and weed density (253 plants/m<sup>2</sup>) were similar among the four crop types and the five Extension Districts of the province. Only 49 of the 77 species encountered during the survey were found in 5% or more of the fields. Low cudweed, corn spurry, and common lambsquarters were the most abundant species, occurring in more than 80% of the fields at a mean density higher than 33.4 plants/m<sup>2</sup>. Red sorrel, smartweed, common hempnettle, broadleaf plantain, and quackgrass were also found in 80% or more of the fields, but at a mean density from 14.4 to 16.5 plants/m<sup>2</sup>. The perennials accounted for 51% of the commonly occurring species, annual and biennial broadleaf species accounted for 43%, and annual grasses were a minor group with only 6% of the species. Weed science. Mar 1990. v. 38 (2). p. 119-124. Includes references. (NAL Call No.: DNAL 79.8 W41).

1220

Weed management decisions in corn based on bioeconomic modeling.

WEESA6. Lybecker, D.W. Schweizer, E.E.; King, R.P. Champaign, Ill. : Weed Science Society of America. A fixed (conventional) weed management strategy in corn was compared to three other strategies (two mixed and one flexible) in terms of weed control, grain yield, gross margin (gross income minus herbicide treatment costs), and herbicide use under furrow irrigation for four consecutive years. The fixed strategy prespecified preplanting, preemergence, postemergence, and layby herbicides. The flexible strategy herbicide treatments were specified by a computer bioeconomic model. Model decisions were based on weed seed in soil before planting, weed

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densities after corn emergence, herbicide costs, expected corn grain yield and selling price, and other parameters. The two mixed strategies were a combination of fixed and flexible strategies and designated either specified soil-applied herbicides (mixed/soil), or no soil-applied herbicide (mixed/no soil); postemergence treatments were determined by the model. Average corn grain yield was 10 280 kg ha<sup>-1</sup> and gross income was 920 \$ ha<sup>-1</sup> and neither differed among strategies. Total weed density and gross margin were significantly higher for the mixed/no soil and flexible strategies compared to the mixed/soil and fixed strategies. Total weed density averaged 28 720, 28 100, 10 910, and 680 plants ha<sup>-1</sup> for the mixed/no soil, flexible, mixed/soil, and fixed strategies, respectively. Annual gross margins for the four strategies averaged 885, 875, 845, and 810 \$ ha<sup>-1</sup>, respectively. Herbicide use over the 4-yr period for these four strategies averaged 3.8, 5.3, 20.5, and 26.9 kg ha<sup>-1</sup>, respectively, and each value differed from the other. Thus, weeds can be managed in corn, gross margins increased, and herbicide use decreased by employing a bioeconomic weed-corn model to make weed management decisions. Weed science. Jan/Mar 1991. v. 39 (1). p. 124-129. Includes references. (NAL Call No.: DNAL 79.8 W41).

1221

Weed management to minimize black cutworm (*Lepidoptera: Noctuidae*) damage in no-till corn. JEENAI. Engelken, L.K. Showers, W.B.; Taylor, S.E. Lanham, Md. : Entomological Society of America. Field studies were conducted in 1984 and 1985 to evaluate the interaction between black cutworm, *Agrotis ipsilon* (Hufnagel), damage and weed competition on no-till corn (*Zea mays* L.) growth and yields. Corn seedling damage by *A. ipsilon* introduced as third instars 5 d before planting was most severe when weeds were removed at the coleoptile stage and larvae were predicted to be fifth to sixth instars. Delaying weed removal until plants had attained the two-leaf stage significantly decreased the percentage of corn plants damaged by *A. ipsilon* larvae. *A. ipsilon* larvae introduced as second instars or a combination of neonate, second, and third instars 5 d before planting damaged more corn plants when weed removal was performed at two-leaf stage corn and larvae were predicted to be fifth to sixth instars. A significant relationship between the number of corn seedlings cut and weed population occurred for these introduced smaller instars when weed removal occurred at two-leaf stage corn. Delaying weed removal until four-leaf stage corn resulted in significant grain yield reductions from both weed competition and *A. ipsilon* damage in 1984 and only from weed competition in 1985. Journal of economic entomology. June 1990. v. 83 (3). p. 1058-1063. Includes references. (NAL Call No.: DNAL 421 J822).

1222

Weed science: 1990 annual research report. Griffin, J.L. Willard, T.S.; LeJeune, K.R. Baton Rouge, La. : The Station. LAES memo series - Louisiana Agricultural Experiment Station. Feb 1991. (55). 94 p. (NAL Call No.: DNAL S54i.5.L8L34).

1223

Weed seed population response to tillage and herbicide use in three irrigated cropping sequences.

WEESA6. Ball, D.A. Miller, S.D. Champaign, Ill. : Weed Science Society of America. Research was conducted to evaluate the effects of primary tillage (moldboard plowing and chisel plowing), secondary tillage (row cultivation), and herbicides on weed species changes in the soil seed bank in three irrigated row cropping sequences over a 3-yr period. The cropping sequences consisted of continuous corn for 3 yr (CN), continuous pinto beans for 3 yr (PB), and sugarbeets for 2 yr followed by corn in the third year (SB). A comparison between moldboard and chisel plowing indicated that weed seed were more prevalent near the soil surface after chisel plowing. The density of certain annual weed seed over the 3-yr period increased more rapidly in the seed bank after chisel plowing compared to moldboard plowing. Species exhibiting the most pronounced increase included hairy nightshade and stinkgrass in the PB cropping sequence and redroot pigweed and common lambsquarters in the SB sequence. Conversely, kochia seed density in the SB sequence decreased more rapidly in chisel-plowed plots. Row cultivation generally reduced seed bank densities of most species compared to uncultivated plots. Herbicide use in each cropping sequence produced a shift in the weed seed bank in favor of species less susceptible to applied herbicides. In particular, seed of hairy nightshade became prevalent in the PB cropping sequence, and seed of kochia, redroot pigweed, and common lambsquarters became prevalent in the SB sequence. Weed science. Nov 1990. v. 38 (6). p. 511-517. Includes references. (NAL Call No.: DNAL 79.8 W41).

1224

Weed seed populations in ridge and conventional tillage.

WEESA6. Forcella, F. Lindstrom, M.J. Champaign, Ill. : Weed Science Society of America. Weed seed and seedling populations, and weed competition were compared in plots of continuous corn and corn/soybean rotation under ridge and conventional tillage. After 7 to 8 yr of standard chemical and mechanical weed control, from 1500 to 3000 weed seeds/m<sup>2</sup> (to a 10-cm depth) were found in continuous corn with ridge tillage whereas about two-thirds fewer seeds were found in conventionally tilled corn. Soil from a corn/soybean rotation had from 200 to 700 seeds/m<sup>2</sup> in both tillage systems. Annual loss of weed seeds from the soil through

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germination was from 3 to 12% in ridge tillage and 11 to 43% in conventional tillage. Additions to the seed pool were supplied by small weeds whose germination was stimulated by "layby" cultivation, with up to 10 times more emergence and 140 times more seed production in ridge than in conventional tillage. Withholding herbicides for 1 yr reduced yields of continuous corn by 10 to 27% in ridge tillage, only 2 to 4% in conventional tillage, and negligibly in corn/soybean rotations regardless of tillage. Reducing seed production of small layby weeds in ridge tillage may aid in solving the weed problem in this conservation tillage system. Nomenclature: Corn, *Zea mays* L.; soybean, *Glycine max* (L.) Merr. Weed science. July 1988. v. 36 (4). p. 500-503. Includes references. (NAL Call No.: DNAL 79.8 W41).

1225

### Weeds.

Wrage, L.J. Brookings, S.D. : The Department. Field facts : soils, insects, diseases, weeds, crops - South Dakota State University, Cooperative Extension Service, Plant Science Department. Dec 30, 1989. v. 3 (25). p. 3-4. (NAL Call No.: DNAL S596.7.F44).

1226

### Wild proso millet control in corn.

Miller, S.D. S.I. : The Society. Research progress report - Western Society of Weed Science. 1988. p. 236-237. (NAL Call No.: DNAL 79.9 W52R).

1227

### Wild proso millet control in corn with postemergence herbicide treatments.

Miller, S.D. Ball, D.A.; Dalrymple, A.W. S.I. : The Society. Research progress report - Western Society of Weed Science. Meeting held March 14-16, 1989, Honolulu, Hawaii. 1989. p. 288-289. (NAL Call No.: DNAL 79.9 W52R).

1228

### Wild proso millet control in corn with preplant incorporated, preemergence, postemergence or complementary treatments.

Miller, S.D. Ball, D.A.; Dalrymple, A.W. S.I. : The Society. Research progress report - Western Society of Weed Science. Meeting held March 14-16, 1989, Honolulu, Hawaii. 1989. p. 286-287. (NAL Call No.: DNAL 79.9 W52R).

1229

### Wild-proso millet (*Panicum miliaceum*) control in central great plains irrigated corn (*Zea mays*).

WETEE9. Westra, P. Wilson, R.G.; Zimdahl, R.L. Champaign, Ill. : The Society. Weed technology : a journal of the Weed Science Society of America. Paper presented at the "Symposium on Wild-Proso Millet," February 9, 1989, Dallas, Texas. Apr/June 1990. v. 4 (2). p. 409-414. Includes references. (NAL Call No.: DNAL SB610.W39).

1230

### Wild proso millet (*Panicum miliaceum*) interference in corn (*Zea mays*).

WEESA6. Wilson, R.G. Westra, P. Champaign, Ill. : Weed Science Society of America. Effects of wild proso millet interference with irrigated corn were evaluated in Nebraska and Colorado over a 2-yr period. Corn yield reductions ranged from 13 to 22% from a wild proso millet density of 10 plants m<sup>-2</sup>. As density increased, corn yield reduction could be predicted with a rectangular hyperbola regression model. Ten wild proso millet plants m<sup>-2</sup> growing with corn produced 4200 to 6200 seed m<sup>-2</sup>. Corn yields were reduced 10% at one location if wild proso millet removal was delayed 2 weeks after corn planting. If removal was further delayed until 6 weeks after corn planting, corn yield reductions at the two locations ranged from 16 to 28%. Weed science. Apr/June 1991. v. 39 (2). p. 217-220. Includes references. (NAL Call No.: DNAL 79.8 W41).

1231

### Woolly cupgrass (*Eriochloa villosa*) control in (*Zea mays*) with pendimethalin/triazine combinations and cultivation.

WEESA6. Schuh, J.F. Harvey, R.G. Champaign, Ill. : Weed Science Society of America. In 1985, 1986, and 1987, pendimethalin at 1.7 kg ai/ha plus 2.2 kg ai/ha cyanazine, 2.2 kg ai/ha atrazine, or 1.1 kg/ha atrazine plus 1.1 kg/ha cyanazine was applied delayed preemergence, early postemergence, and postemergence with and without cultivation to evaluate woolly cupgrass control and corn injury. Results varied from year to year. Dry conditions in 1985 resulted in poorer woolly cupgrass control while cold and wet environments in 1987 resulted in corn injury and reduced yields from postemergence treatments containing cyanazine. Good early-season suppression of woolly cupgrass deteriorated to less than 75% control by the late-season evaluation in all experiments. The best woolly cupgrass control and highest corn yields were usually achieved when herbicide applications were followed by row cultivation. Corn yield increases averaged 28, 17, and 11% in 1985, 1986, and 1987, respectively, when a herbicide treatment was followed by row cultivation. Pendimethalin/triazine treatments followed with a row cultivation adequately suppressed woolly cupgrass in field corn, but adverse environmental conditions often reduced

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herbicide effectiveness or increased corn injury. Weed science. May 1989. v. 37 (3). p. 405-411. Includes references. (NAL Call No.: DNAL 79.8 W41).

1232

1987 crop science extension on-farm weed management tests /A.C. York ... et al. . York, A. C.\_1952-; Lewis, W. M.\_1929-; Oliver, G. W.; Warren, L. S. Raleigh, N.C. : N.C. State University, 1988? . Chiefly tables. 261 p. ; 28 cm. (NAL Call No.: DNAL SB612.N8N5).

1233

1992 weed control guide for field crops. MUCBA. Renner, K.A. Keills, J.J. East Lansing, Mich. : The Service. Extension bulletin E - Cooperative Extension Service, Michigan State University. Nov 1991. (434,rev.). 126 p. (NAL Call No.: DNAL 275.29 M58B).

# PESTICIDES - GENERAL

1234

**Accumulation of polychlorobiphenyl congeners and p,p-DDE at environmental concentrations by corn and beans.**

EESAD. Shane, L.A. Bush, B. Duluth, Minn. : Academic Press. Ecotoxicology and environmental safety. Feb 1989. v. 17 (1). p. 38-46. Includes references. (NAL Call No.: DNAL QH545.A1E29).

1235

**Adsorption and deactivation of norflurazon by activated charcoal.**

WETEE9. Lamoreaux, R.J. Corbin, V.L.; Johl, B.S. Champaign, Ill. : The Society. Weed technology : a journal of the Weed Science Society of America. Apr/June 1989. v. 3 (2). p. 297-302. Includes references. (NAL Call No.: DNAL SB610.W39).

1236

**Antidotal effects of dichlormid and R-29148 on the herbicidal activity of chlorimuron and sulfometuron.**

PNWSB. Zbiec, I.I. Devlin, R.M. College Park, Md. : The Society. Proceedings of the annual meeting - Northeastern Weed Science Society. 1990. v. 44. p. 6-10. Includes references. (NAL Call No.: DNAL 79.9 N814).

1237

**Atrazine metabolite behavior in soil-core microcosms: Formation, disappearance, and bound residues.**

ACSMC. Winkelmann, D.A. Klaine, S.J. Washington, D.C. : The Society. ACS Symposium series - American Chemical Society. In the series analytic: Pesticide Transformation Products: Fate and significance in the environment / edited by L. Somasundaram and J.R. Coats. ~ Literature review. 1991. (459). p. 75-92. Includes references. (NAL Call No.: DNAL QD1.A45).

1238

**Availability and persistence of imazaquin, imazethapyr, and clomazone in soil.**

WEESA6. Loux, M.M. Liebl, R.A.; Slife, F.W. Champaign, Ill. : Weed Science Society of America. The availability and persistence of imazaquin, imazethapyr, and clomazone were studied in a Cisne silt loam (1.3% organic matter) and a Drummer silty clay loam (5.8% organic matter). Availability of all three herbicides to bioassay species was greater in the Cisne soil than in the Drummer soil. Corn root growth was more sensitive to imazaquin and imazethapyr than corn shoot growth. Shoot and root growth of wheat was inhibited by similar clomazone concentrations. In field experiments conducted in 1984, 1985, and 1986, all three herbicides were more persistent in the Drummer

silty clay loam than in the Cisne silt loam. Clomazone and imazethapyr were detected by liquid or gas chromatographic analysis in the Drummer soil 3 yr following application. Crop injury occurred 5 months after application of imazaquin and clomazone to the Drummer soil. In the Cisne soil, only imazethapyr caused crop injury 5 months after application. Herbicide residues found below 7.5 cm were greater in the Drummer soil than in the Cisne soil. Weed science. Mar 1989. v. 37 (2). p. 259-267. Includes references. (NAL Call No.: DNAL 79.8 W41).

1239

**Chlorimuron ethyl metabolism in corn.**

PCPB. Lamoureux, G.L. Rusness, D.G.; Tanaka, F.S. Orlando, Fla. : Academic Press.

<sup>14</sup>C chlorimuron ethyl was readily absorbed by the roots of young intact corn seedlings and through the cut ends of excised leaves, but it was not readily absorbed by intact leaves. Under the conditions employed, <sup>14</sup>C chlorimuron ethyl was metabolized at a moderate rate in both intact roots and excised leaves (ca. 2.4 mmol/g fresh wt tissue/hr). Based upon high-performance liquid chromatography (HPLC) analysis, <sup>14</sup>C chlorimuron ethyl appeared to be metabolized by similar routes in both the roots and leaves. <sup>14</sup>C chlorimuron ethyl and 10 radioactive metabolites were detected in the roots of corn 7 hr following herbicide treatment. <sup>14</sup>C chlorimuron ethyl and seven metabolites, listed in approximate order of their abundance, were isolated and characterized: chlorimuron ethyl (N- 4-chloro-6-methoxypyrimidine-2-yl -N'-2-ethoxycarbonylbenzenesulfonyl urea; (I) N-(4-chloro-5-hydroxy-6-methoxypyrimidine-2-yl)-N'-(2-ethoxycarbonylbenzenesulfonyl)urea, (II) 2-ethoxycarbonylbenzene sulfonamide, (IV) N-(4-S-glutathionyl-6-methoxypyrimidine-2-yl)-N'-(2-ethoxycarbonylbenzenesulfonyl)urea, (VI) N-(4-S-glutathionyl-5-hydroxy-6-methoxypyrimidine-2-yl)-N'-(2-ethoxycarbonylbenzenesulfonyl)urea, (III) N-(4-chloro-5-O-beta-D-glucosyl-6-methoxypyrimidine-2-yl)-N'-(2-ethoxycarbonylbenzenesulfonyl)urea, (VII) N-(4-chloro-6-methoxypyrimidine-2-yl)-N'-(2-ethoxy-?-O-beta-D-glucosyl benzenesulfonyl)urea, and (V)

N-(4-S-cysteinyl-6-methoxypyrimidine-2-yl)-N'-(2-ethoxycarbonylbenzenesulfonyl)urea. Chlorimuron ethyl and these metabolites were purified by HPLC and were characterized by fast atom bombardment mass spectrometry (FAB MS). In addition to FAB MS, the following methods were used in the characterization of some metabolites: synthesis, hydrolysis with beta-glucosidase, analysis of hydrolysis products, electron impact mass spectrometry, and proton nuclear magnetic resonance (400 MHz). Pesticide biochemistry and physiology. Sept 1991. v. 41 (1). p. 66-81. Includes references. (NAL Call No.: DNAL SB951.P49).

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1240

A comparison of the persistence in a clay loam of single and repeated annual applications of seven granular insecticides used for corn rootworm control.

JPF02. Harris, C.R. Chapman, R.A.; Tolman, J.H.; Moy, P.; Henning, K.; Harris, C. New York, N.Y. : Marcel Dekker. Journal of environmental science and health. Part B. Pesticides, food contaminants, and agricultural wastes. 1988. v. 23 (1). p. 1-32. Includes references. (NAL Call No.: ONAL T0172.U61).

1241

Corn borer vaccine by crop genetics passes two tests.

WSJOAF. Allen, F. New York, N.Y. : Dow Jones. The Wall Street journal. Nov 10, 1989. p. B4. (NAL Call No.: ONAL 284.28 W15).

1242

Corn growth retardation resulting from soybean herbicide residues.

OJSCA. Beuerlein, M. Loux, M.; Beuerlein, J. Columbus, Ohio : Ohio Academy of Science. Ohio journal of science. June 1990. v. 90 (3). p. 67-70. Includes references. (NAL Call No.: DNAL 410 OH3).

1243

Cyclohexanedione herbicides are selective and potent inhibitors of acetyl-CoA carboxylase from grasses.

PLPHA. Rendina, A.R. Felts, J.M. Rockville, Md. : American Society of Plant Physiologists. Plant physiology. Apr 1988. v. 86 (4). p. 983-986. Includes references. (NAL Call No.: ONAL 450 P692).

1244

Degradation of terbufos in soils during drought conditions.

Cobb, G.P. Brewer, L.W.; Kendall, R.J. Blacksburg : Virginia Water Resources Research Center, VPI and State University, 1989. Pesticides in terrestrial and aquatic environments : proceedings of a national research conference, May 11-12, 1989 / edited by Diana L. Weigmann. p. 159-170. Includes references. (NAL Call No.: ONAL QH545.P4P4844).

1245

Desorption of atrazine and cyanazine from soil. JEVQAA. Clay, S.A. Allmaras, R.R.; Koskinen, W.C.; Wyse, O.L. Madison, Wis. : American Society of Agronomy. Removal of soluble soil organic carbon (SSOC) during herbicide desorption studies using the batch

equilibration method may affect the herbicide-soil-solution equilibrium particularly if herbicide-SSOC complexes can form. Desorption characteristics of atrazine (2-chloro-4-ethylamino-6-isopropylamino-s-triazine) and cyanazine (2-4-chloro-6-(ethylamino)-s-(triazine-2-ylamino)-2-methylpropionitrile were determined in a Ves clay loam (Aquic Hapludolls). For adsorption, the soil was equilibrated with 0.01 M CaCl<sub>2</sub> solutions containing atrazine or cyanazine. Desorption with 0.01 M CaCl<sub>2</sub> each day for 5 d resulted in hysteresis when compared to the adsorption isotherm. Replacement of the equilibration solution with soil extract for 5 d, while maintaining a higher SSOC content in the desorption equilibration solution than did the CaCl<sub>2</sub> solution, did not change desorption isotherm equations. The SSOC-herbicide complexes were not detected in any of the adsorption and desorption equilibration solutions by ultrafiltration (membranes with molecular mass cut offs of 10 000 and 500 daltons), HPLC, or TLC techniques. Either s-triazine-SSOC complexes were not formed in sufficient quantities or they were not stable enough to affect desorption of the ?herbicide during batch equilibration. Journal of environmental quality. Oct/Oec 1988. v. 17 (4). p. 719-723. Includes references. (NAL Call No.: ONAL QH540.U6).

1246

Developing herbicide resistance in corn.

Schoper, J. Armstrong-Gustafson, P.; McBratney, B. Urbana, Ill. : Cooperative Extension Service, Univ of Illinois at Urbana-Champaign, 1991 . Illinois Agricultural Pesticides Conference summaries of presentations January 8, 9, 10, 1991, Urbana, Illinois / Univ of Illinois at Urbana-Champaign, Coop Ext Serv, in coop with the Illinois Natural History Survey. "Proceedings of the 1991 Illinois Agricultural Pesticides Conference," January 8-10, 1991, Urbana, Illinois. p. 59-60. (NAL Call No.: ONAL SB950.2.I3I4).

1247

Development of tools for evaluating herbicide injury to corn /by James R. Smart.

Smart, James R. 1991. Thesis (Ph.D.)--University of Nebraska--Lincoln, 1991. viii, 122 leaves : ill. ; 28 cm. Includes bibliographical references. (NAL Call No.: NBU L03656.5 1991 S637).

1248

Differential imazaquin tolerance and behavior in selected corn (*Zea mays*) hybrids.

WEESA6. Sander, K.W. Barrett, M. Champaign, Ill. : Weed Science Society of America. 'Cargill 921', 'Great Lakes 422', Northrup King 9410', 'Pioneer 3901', 'Pioneer 3737', and

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'Stauffer 5650' corn hybrids were tested in the greenhouse for imazaquin tolerance. Imazaquin rates that reduced shoot growth 50%, when compared to the untreated hybrid check, ranged from 17 to 50 g/ha. When averaged together, the three most tolerant hybrids (Cargill 921, Pioneer 3901, and Great Lakes 422) were approximately one-half as sensitive to imazaquin as the three least tolerant hybrids (Northrup King 9410, Pioneer 3737, and Stauffer 5650). Studies were conducted to determine if the observed differential tolerance was caused by differences in acetolactate synthase (ALS, EC 4.1.3.18) levels and sensitivity of ALS to imazaquin. Differential imazaquin uptake, translocation, and/or metabolism were also studied as a basis for the tolerance range as was seed size and seedling growth. There were differences among hybrids in the physiological and growth parameters studied; however, these differences did not correlate with imazaquin tolerance. None of the factors studied could alone account for the differences in imazaquin tolerance. Weed science. May 1989. v. 37 (3). p. 290-295. Includes references. (NAL Call No.: DNAL 79.8 W41).

1249

**Differential response of corn hybrids and inbreds to metolachlor.**  
WEESA6. Rowe, L. Rossman, E.; Penner, D. Champaign, Ill. : Weed Science Society of America. Greenhouse studies were conducted to determine the response of 200 corn hybrids and 29 inbreds to metolachlor applied at 4.5 kg ai ha<sup>-1</sup>. Both hybrids and inbreds varied in their response to the herbicide. The distribution of injury revealed a normal distribution curve with most of the hybrids having a midlevel of tolerance. Some hybrids were very tolerant, while others were quite sensitive. Laboratory studies were conducted to evaluate absorption and metabolism of <sup>14</sup>C-metolachlor for a subset of tolerant and sensitive hybrids. There was no observed difference in the product of metolachlor metabolism in the tolerant and sensitive hybrids. The observed variability in metolachlor tolerance among hybrids appeared due to differences in the amount of metolachlor absorption and metabolism and differences at the site of metolachlor action. The tolerant 'Great Lakes 584' hybrid absorbed significantly less <sup>14</sup>C-metolachlor than did the sensitive 'Pioneer 3744', while the tolerant 'Cargill 7567' metabolized significantly faster more <sup>14</sup>C-metolachlor than the other hybrids. The internal concentrations of available <sup>14</sup>C-metolachlor were the same for the tolerant Cargill 7567 and the sensitive 'Northrup King 9283' after 8 h, indicating differences at the site of action of metolachlor for these two hybrids. Weed science. Nov 1990. v. 38 (6). p. 563-566. Includes references. (NAL Call No.: DNAL 79.8 W41).

1250

**Dominant mutations causing alterations in acetyl-coenzyme A carboxylase confer tolerance to cyclohexanone and aryloxyphenoxypropionate herbicides in maize.**  
PNASA. Parker, W.B. Marshall, L.C.; Burton, J.D.; Somers, D.A.; Wyse, D.L.; Gronwald, J.W.; Gengenbach, B.G. Washington, D.C. : The Academy. Proceedings of the National Academy of Sciences of the United States of America. Sept 1990. v. 87 (18). p. 7175-7179. ill. Includes references. (NAL Call No.: DNAL 500 N21P).

1251

**Effect of atrazine and tillage on alfalfa (*Medicago sativa*) establishment in corn (*Zea mays*)-alfalfa rotation.**  
WETEE9. Kells, J.J. Leep, R.H.; Tesar, M.B.; Leavitt, R.A.; Cudnohufsky, J. Champaign, Ill. : The Society. Weed technology : a journal of the Weed Science Society of America. Apr/June 1990. v. 4 (2). p. 360-365. ill. Includes references. (NAL Call No.: DNAL SB610.W39).

1252

**Effect of BAS-145-138 as an antidote for sulfonylurea herbicides.**  
WETEE9. Devlin, R.M. Zbiec, I.I. Champaign, Ill. : The Society. Weed technology : a journal of the Weed Science Society of America. Apr/June 1990. v. 4 (2). p. 337-340. Includes references. (NAL Call No.: DNAL SB610.W39).

1253

**Effect of triazine residue on winter wheat following field corn.**  
PNWSB. Webb, F. Causey, M. College Park, Md. : The Society. Proceedings of the annual meeting - Northeastern Weed Science Society. 1990. v. 44. 78-79. (NAL Call No.: DNAL 79.9 N814).

1254

**Effects of diclofop and diclofop-methyl on membrane potentials in roots of intact oat, maize, and pea seedlings.**  
PLPHA. DiTomaso, J.M. Brown, P.H.; Stowe, A.E.; Linscott, D.L.; Kochian, L.V. Rockville, Md. : American Society of Plant Physiologists. Growth and electrophysiological studies in roots of intact diclofop-methyl susceptible and resistant seedlings were conducted to test the hypothesis that the herbicide acts primarily as a proton ionophore. The ester formulation of diclofop, at 0.2 micromolar, completely inhibited root growth in herbicide-susceptible oat (*Avena sativa* L.) after a 96 hour treatment, but induced only a delayed transient depolarization of the membrane potential in oat root cortical cells. Root growth in susceptible maize (*Zea mays* L.) seedlings was dramatically reduced by exposure to 0.8 micromolar

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diclofop-methyl, while the same diclofop-methyl exposure hyperpolarized the membrane potential within 48 hours after treatment. Furthermore, exposure of maize roots to the protonophore, carbonyl cyanide m-chlorophenylhydrazone (CCCP) (50 nanomolar), inhibited growth by only 31%, 96 hours after treatment, while the same CCCP exposure depolarized the resting potential by an average of 32 millivolts. Thus, the protonophore hypothesis cannot account for a differential membrane response to phytotoxic levels of diclofop-methyl in two susceptible species. From the results of others, much of the evidence to support the protonophore hypothesis was obtained using high concentrations of diclofop acid (100 micromolar). At a similar concentration, we also report a rapid (3 minute) diclofop-induced depolarization of the membrane potential in roots of susceptible oat and maize, moderately tolerant barley (*Hordeum vulgare* L.), and resistant pea (*Pisum sativum* L.) seedlings. Moreover, 100 micromolar diclofop acid inhibited growth in excised cultured pea roots. In contrast, 100 micromolar diclofop-methyl did not inhibit root growth. Since the membrane response to 100 micromolar diclofop acid does not correspond to differential herbicide sensitivity under field conditions, results obtained with very high levels of diclofop acid are probably physiologically irrelevant. The results of this study suggest that th. Plant physiology. Apr 1991. v. 95 (4). p. 1063-1069. Includes references. (NAL Call No.: DNAL 450 P692).

1255

**Effects of diclofop and haloxyfop on lipid synthesis in corn (*Zea mays*) and bean (*Phaseolus vulgaris*).**  
WEESA6. Boldt, L.D. Barrett, M. Champaign, Ill. : Weed Science Society of America. Diclofop-methyl and haloxyfop-methyl (0.001 to 10 micromoles) caused 9 to 61% inhibition of <sup>14</sup>C-acetate incorporation into lipids in corn leaf segments within 1 h of herbicide treatment, while neither herbicide affected this process in bean leaf segments. The herbicides did not affect <sup>14</sup>C-malonate incorporation into lipids in corn leaf segments. Diclofop-methyl and haloxyfop-methyl reduced <sup>14</sup>C-acetate incorporation into polar lipids and triglycerides in corn while incorporation into sterols was increased. In vitro activity of acetyl-coenzyme A carboxylase (EC 6.4.1.2) was inhibited from 26 to 94% within 5 min of exposure to the herbicides (1 to 10 micromoles). Diclofop acid inhibited this enzyme activity more than did haloxyfop acid. Differences in field activity between diclofop-methyl and haloxyfop-methyl are not related to differential sensitivity of acetyl-coenzyme A carboxylase to the two herbicides. Weed science. Apr/June 1991. v. 39 (2). p. 143-148. Includes references. (NAL Call No.: DNAL 79.8 W41).

1256

**Effects of ethephon on corn at different N levels.**

PNWSB. Else, M.J. Ilnicki, R.D.; Enache, A.J. College Park, Md. : The Society. Proceedings of the annual meeting - Northeastern Weed Science Society. Meeting held January 6, 7 & 8, 1988 in Hartford, Connecticut. 1988. v. 42. p. 13-17. Includes references. (NAL Call No.: DNAL 79.9 N814).

1257

**Effects of herbicide safeners on levels and activity of cytochrome P-450 and other enzymes of corn.**

Komives, T. Dutka, F. San Diego : Academic Press, c1989. Crop safeners for herbicides : development, uses, and mechanisms of action / edited by Kriton K. Hatzios and Robert E. Hoagland. Literature review. p. 129-145. Includes references. (NAL Call No.: DNAL SB951.45.C76).

1258

**Effects of napropamide on growth and anatomy of corn, *Zea mays*, roots.**

WEESA6. Di Tomaso, J.M. Ashton, F.M.; Rost, T.L. Champaign, Ill. : Weed Science Society of America. Structural studies were conducted to evaluate the effects of napropamide on growth and development of corn roots. At 1.0 and 10.0 micrometer napropamide, root growth was inhibited severely within 3 days of seed germination. Root diameter within 1 mm of the root apex doubled and numerous lateral root primordia were observed within 10 mm of the meristem tip in treated roots. The number of cortical parenchyma cell files, xylem vessel, and phloem sieve tube strands also significantly increased. Average cortical cell size did not change, regardless of the treatment. A lateral expansion of the meristematic region of the root coincided with a slight reduction in meristem length but resulted in an overall increase in meristem volume. However, enlargement of the meristem occurred despite a reduction in the number of mitotic figures in the root meristem. Treatment of excised root tips for 24 h with 20 micrometer napropamide reduced the number of mitotic figures 84%. Nomenclature: Napropamide, N,N-diethyl-2-(1-naphthalen-oxo) propionamide; corn, *Zea mays* L. 'Iochief'. Weed science. July 1988. v. 36 (4). p. 457-463. ill. Includes references. (NAL Call No.: DNAL 79.8 W41).

1259

**The effects of no-till and moldboard plow tillage on the movement of nitrates and pesticides through the Vadose Zone.**

PNDAAZ. Bischoff, J. Bender, A.; Carlson, C. Grand Forks, N.D. : The Academy. Proceedings of the North Dakota Academy of Science. Apr 1990. v. 44. p. 42. Includes references. (NAL Call

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No.: DNAL 500 N813).

1260

### Effects of trifluralin on corn (*Zea mays*) growth and nutrient content.

WEESA6. Hartzler, R.G. Fawcett, R.S.; Taber, H.G. Champaign, Ill. : Weed Science Society of America. Glasshouse experiments were conducted to determine the effects of trifluralin on root growth and mineral relations of corn seedlings. Root weight to shoot weight ratios of corn seedlings were positively correlated to concentrations of trifluralin in soil. Root length to shoot weight ratios, however, were inversely related to trifluralin concentrations. Phosphorous and potassium concentrations in shoot tissue were reduced 60 and 35%, respectively, by 0.25 mg trifluralin kg<sup>-1</sup> soil. Growth inhibition due to trifluralin was partially overcome by supplementing soil with nutrients. Weed science. Nov 1990. v. 38 (6). p. 468-470. Includes references. (NAL Call No.: DNAL 79.8 W41).

1261

### Efficacy and mode of action of CGA-154281, a protectant for corn (*Zea mays*) from metolachlor injury.

WEESA6. Rowe, L. Kells, J.J.; Penner, D. Champaign, Ill. : Weed Science Society of America. Greenhouse and field studies were conducted to determine the influence of herbicide rate, hybrid variability, and soil moisture on the effectiveness of CGA-154281 in protecting corn seedlings from metolachlor injury. High rates of metolachlor caused significant injury to seedlings of sensitive corn hybrids. However, with metolachlor plus CGA-154281, very few injury symptoms were observed, even with the 7.8 kg ha<sup>-1</sup> rate and the most sensitive hybrid. Corn seedlings were not injured by metolachlor plus CGA-154281 at the highest soil moisture level evaluated, whereas those treated with metolachlor alone showed 70% injury. Metolachlor injury increased as soil moisture content increased. In the greenhouse, CGA-154281 did not protect any of the eight weed species tested against injury by 2.2 kg ha<sup>-1</sup> metolachlor. In laboratory studies, CGA-154281 did not alter the absorption of <sup>14</sup>C-metolachlor during an 8-h period. Qualitative comparison of the metabolism of metolachlor in the presence or absence of the protectant indicated that metolachlor was metabolized to a more polar metabolite, believed to be a glutathione conjugate. However, CGA-154281 significantly enhanced the rate of metabolism of metolachlor in three of the four hybrids tested. Metolachlor metabolism activity may already have been functioning at a maximum level in the unaffected hybrid. Weed science. Jan/Mar 1991. v. 39 (1). p. 78-82. Includes references. (NAL Call No.: DNAL 79.8 W41).

1262

### Factors affecting bioactivity of soil insecticides: relationships among uptake, desorption, and toxicity of carbofuran and terbufos.

JEENAI. Felsot, A.S. Lew, A. Lanham, Md. : Entomological Society of America. Toxicities of insecticides applied to soil vary with soil type. The content of organic matter in soil seems to be most strongly associated with differences in toxicity. To test the hypothesis, that partitioning processes in soil influence toxicity by affecting the availability of the insecticides to the insects, we measured the uptake by southern corn rootworm, *Diabrotica undecimpunctata howardii* Barber, larvae of two concentrations of terbufos and carbofuran in four soil types. Desorption of the two insecticides from the soil into a calcium chloride solution also was determined. Concentration-response estimates for each insecticide were correlated with measurements of the uptake of the insecticides by larvae and the potential for desorption of the insecticide. Multiple regression analysis indicated that organic carbon content of the soil accounted for the greatest proportion of variability in LC50 and LC95. Uptake and desorption also were significantly correlated with organic carbon content. The data supported the role of partitioning in explaining toxicity of insecticides applied to soil. Journal of economic entomology. Apr 1989. v. 82 (2). p. 389-395. Includes references. (NAL Call No.: DNAL 421 J822).

1263

### Factors affecting the activity of thifensulfuron.

WEESA6. Zhao, C.C. Teasdale, J.R.; Coffman, C.B. Champaign, Ill. : Weed Science Society of America. The influence of various factors on the tolerance of corn and selected weed species to thifensulfuron was studied in greenhouse experiments. Corn fresh weight was reduced by postemergence application of thifensulfuron when applied at 180 g ai ha<sup>-1</sup> without surfactant or at 18 g ha<sup>-1</sup> with a nonionic surfactant. Corn was more susceptible to root exposure whereas velvetleaf was more susceptible to foliar exposure. Velvetleaf was most susceptible when plants were young, when a nonionic surfactant was added, and at 20 rather than 30 C. Simulated rainfall 8 h after application reduced velvetleaf injury by thifensulfuron at 18 g ha<sup>-1</sup> without surfactant; however, with addition of a nonionic surfactant, velvetleaf injury was reduced only if rainfall occurred less than 2 h after application. Soil moisture level did not affect velvetleaf susceptibility. Weed science. Nov 1990. v. 38 (6). p. 553-557. Includes references. (NAL Call No.: DNAL 79.8 W41).

## (PESTICIDES - GENERAL)

1264

**Field corn: managing pesticides for crop production and water quality protection--a supplement to the IFAS pest control guides.**  
Hornsby, A.G. Buttler, T.M.; Colvin, D.L.; Sprenkel, R.E.; Dunn, R.A.; Kucharek, T.A. Gainesville, Fla. : The Service. Circular - Florida Cooperative Extension Service. In subseries: Water Quality Initiative Series. May 1991. (1982). 10 p. (NAL Call No.: DNAL 275.29 F66C).

1265

**Formation and transport of deethylatrazine in the soil and vadose zone.**  
JEVQAA. Adams, C.D. Thurman, E.M. Madison, Wis. : American Society of Agronomy. Atrazine 2-chloro-4-ethylamino-6-isopropylamino-s-triazine) and two degradation products were monitored at seven depths in the soil and vadose zone throughout the growing season in two experimental plots in which corn (*Zea mays L.*) was grown. The soils in these plots were a Kimo silty clay loam (clayey over loamy, montmorillonitic, mesic, Fluvaquentic Hapludoll) and a Eudora silt loam (coarse, silty, mixed, mesic, Fluventic Hapludoll). The purpose of this field study was to identify and quantify the mobile and persistent degradation products of atrazine that comprise the input, or "source term," to groundwater resulting from the application of atrazine to the soils. The formation of deethylatrazine (2-amino-4-chloro-6-isopropylamino-s-triazine) and deisopropylatrazine (2-amino-4-chloro-6-ethylamino-s-triazine) was monitored at various depths using suction lysimeters to determine the relative proportions at which these compounds enter the aquifer. Deethylatrazine was the major degradation product of atrazine identified in the soil water and appeared to enter the underlying aquifer at a concentration of 5.0 microgram/L, which was greater than the concentration of atrazine entering the aquifer. Deisopropylatrazine also was detected in the soil water, but only in minor concentrations relative to atrazine and deethylatrazine. Because deethylatrazine was the major degradation product in the unsaturated zone, the deethylatrazine-to-atrazine ratio (DAR) may be a good indicator of transport of atrazine through the soil. The hypothesis is proposed that the DAR may be used to distinguish point-source from nonpoint-source contamination of an aquifer. Journal of environmental quality. July/Sept 1991. v. 20 (3). p. 540-547. Includes references. (NAL Call No.: DNAL QH540.J6).

1266

**Ground water and agricultural chemicalsunderstanding the issues /presented as a service to agriculture by the American Soybean Association and the National Corn Growers Association.**  
St. Louis, Mo.? : American Soybean

Association : National Corn Growers Association, c1988. Abstract: This videotape defines ground water, identifies types of pollutants, and stresses the importance of the pesticide applicator's (the farmer's) responsibility to protect ground water from contamination by proper application and safe use of agricultural chemicals. It demonstrates how to reduce risks of ground water contamination by preventing back siphoning, protecting existing well heads, pressure of triple rinsing of containers, using leak free containers, securing pesticides during transport and properly mixing, loading, handling and storing pesticides away from wells and water supplies. VHS. 1 videocassette (17 min., 40 sec.) : sd., col. ; 1/2 in. (NAL Call No.: DNAL Videocassette no.924).

1267

**Growth and physiological responses of normal, dwarf, and albino corn (*Zea mays*) to clomazone treatments.**  
PCBPP. Vencill, W.K. Hatzios, K.K.; Wilson, H.P. Duluth, Minn. : Academic Press. Pesticide biochemistry and physiology. Sept 1989. v. 35 (1). p. 81-88. ill. Includes references. (NAL Call No.: DNAL SB951.P49).

1268

**Haloxlyfop inhibition of the pyruvate and the alpha-ketoglutarate dehydrogenase complexes of corn (*Zea mays L.*) and soybean (*Glycine max L. Merr.*).**  
PLPPA. Cho, H.Y. Widholm, J.M.; Slife, F.W. Rockville, Md. : American Society of Plant Physiologists. Plant physiology. June 1988. v. 87 (2). p. 334-340. Includes references. (NAL Call No.: DNAL 450 P692).

1269

**Herbicidal effects of fomesafen.**  
PNWSB. Devlin, R.M. Koszanski, Z.K. College Park, Md. : The Society. Proceedings of the annual meeting - Northeastern Weed Science Society. Meeting held January 6, 7 & 8, 1988 in Hartford, Connecticut. 1988. v. 42. p. 67-72. Includes references. (NAL Call No.: DNAL 79.9 N814).

1270

**Herbicide ban: do costs outweigh benefits?**  
MINSB. Lewis, A. St. Paul, Minn. : The Station. Minnesota science - Agricultural Experiment Station, University of Minnesota. Summer 1991. v. 46 (2). p. 2. (NAL Call No.: DNAL 100 M668).

## (PESTICIDES - GENERAL)

1271

**Herbicides in surface waters of the midwestern United States: the effect of spring flush.**  
ESTHAG. Thurman, E.M. Goolsby, D.A.; Meyer, M.T.; Kolpin, D.W. Washington, D.C. : American Chemical Society. Environmental science & technology. Oct 1991. v. 25 (10). p. 1794-1796. Includes references. (NAL Call No.: DNAL TD420.A1E5).

1272

### Herbicides that inhibit acetohydroxyacid synthase.

WEESA6. Stidham, M.A. Champaign, Ill. : Weed Science Society of America. Acetohydroxyacid synthase was discovered as the site of action of imidazolinone and sulfonylurea herbicides over 6 yr ago. In recent years, advances have been made in the understanding of this enzyme as a herbicide target site. Derivatives of both imidazolinones and sulfonylureas have yielded new herbicide chemistry. All of the herbicides display unusual "slow-binding" behavior with the enzyme, and this behavior may help explain efficacy of the herbicides. Resistance to these herbicides has been developed through a number of different procedures, and the mechanism of resistance is through changes in sensitivity of the enzyme to the herbicides. The changes are either selective to only one class of chemistry, or broad to a number of classes of chemistry. These data support the idea that binding sites for the herbicides on the enzyme are only partially overlapping. Progress in purification of AHAS from corn includes discovery of the existence of the enzyme in monomer and oligomer aggregation states. The interaction of the enzyme with the herbicides is affected by enzyme aggregation state. Weed science. Paper presented at the "Symposium on Herbicide Mechanism of Action," January 7, 1990, Montreal, Canada. July/Sept 1991. v. 39 (3). p. 428-434. Includes references. (NAL Call No.: DNAL 79.8 W41).

1273

### Implications of chemical use reduction for Texas agriculture.

Knutson, R.D. Smith, E.G.; Penson, J.B.; Taylor, C.R. College Station, Tex. : Agricultural & Food Policy Center. AFPC policy working paper. June 1990. (90-4). 18 p. (NAL Call No.: DNAL HD1751.A36).

1274

### In-furrow insecticide interactions with Accent and Beacon.

LOAGA. Reynolds, D.B. Burris, E.; Leonard, B.R. Baton Rouge, La. : The Station. Louisiana agriculture - Louisiana Agricultural Experiment Station. Summer 1991. v. 34 (4). p. 3-4, 19. (NAL Call No.: DNAL L939).

1275

**Influence of available soil water content, temperature, and CGA-154281 on metolachlor injury to corn.**  
WEESA6. Viger, P.R. Eberlein, C.V.; Fuerst, E.P. Champaign, Ill. : Weed Science Society of America. The effects of the antidote CGA-154281, available soil water (ASW), and soil temperature on corn injury from preemergence applications of metolachlor were evaluated in field and growth chamber studies. In field studies, metolachlor at rates of 5.6, 8.4, and 11.2 kg ha<sup>-1</sup> caused corn injury when there was sufficient ASW before corn emergence to activate the herbicide. Injury was prevented when CGA-154281 was applied with metolachlor (30:1, metolachlor:CGA-154281 by wt). The effects of surface-soil ASW, soil temperature, and CGA-154281 on corn tolerance to metolachlor were further evaluated in growth chamber studies. Corn injury from metolachlor was more severe when the surface soil was wet for 5 days immediately after herbicide treatment than when the surface-soil was dry. Corn injury from metolachlor also was greater when corn was grown under cool temperatures (21/13 C, day/night) than when grown under warm temperatures (30/21 C, day/night). CGA-conferred protection against metolachlor injury regardless of surface soil ASW or growth temperature. Weed science. Apr/June 1991. v. 39 (2). p. 227-231. Includes references. (NAL Call No.: DNAL 79.8 W41).

1276

### Influence of edaphological factors on residual activity of selected insecticides in laboratory studies with emphasis on soil moisture and temperature.

JEENAI. Monke, B.J. Mayo, Z.B. Lanham, Md. : Entomological Society of America. A bioassay procedure using southern corn rootworm larvae (*Diabrotica undecimpunctata howardi* Barber) was used to study the effects of different soils and soil factors on the relative decline in biological activity of six soil insecticides. Larval mortality was used as an index of the effect of various soil factors on the persistence of carbofuran, chlorpyrifos, fonofos, isofenphos, phorate, and terbufos. The range in LC90's across all soils was least for terbufos and greatest for carbofuran. LC90's increased as the percentage of organic matter increased. Temperature had very little effect on the change in mortality. Mortality was least depressed at the high moisture level for chlorpyrifos, isofenphos, and to some extent, carbofuran. Phorate response was variable. Mortality from fonofos and terbufos was appreciably decreased at the high moisture level. Mortality in carbofuran treatments declined as soil pH increased. Chlorpyrifos and terbufos activity decreased in soils with a higher percentage of clay. Carbofuran and isofenphos consistently maintained biological activity the longest. Journal of economic entomology. Feb 1990. v. 83 (1). p. 226-233. Includes references. (NAL Call No.: DNAL 421 J822).

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1277

### Inhibition of chloroplast-mediated reactions by quizalofop herbicide.

WEESA6. Ruizzo, M.A. Gorski, S.F. Champaign, Ill. : Weed Science Society of America. A mechanism of action of the ethyl ester of quizalofop was determined in monocotyledonous and dicotyledonous plants. Quizalofop inhibited electron transport in both cucumber and corn chloroplasts. In corn, inhibition of electron transport was more pronounced under phosphorylating conditions. Half-maximal inhibition ( $I_{50}$ ) of ATP synthesis was achieved with a 75-microM concentration of quizalofop in coupled corn chloroplasts. Cucumber chloroplast ATP synthesis was not inhibited at herbicide concentrations up to 100 microM. Corn chloroplast fractions contained greater quantities of bound  $^{14}\text{C}$  quizalofop ester following incubation in light and dark assays. Thin-layer radiochromatograms of  $^{14}\text{C}$ -labeled quizalofop showed no metabolism or degradation of parent ester incubated in light and dark chloroplast-mediated reactions. In our studies, it is apparent that the inhibitory action of quizalofop was due to the parent ester. The ester formulation of quizalofop appears to exhibit multiple activity in susceptible plant chloroplasts. Weed science. Nov 1988. v. 36 (6). p. 713-718. Includes references. (NAL Call No.: DNAL 79.8 W41).

1278

### Inhibition of corn acetyl-CoA carboxylase by cyclohexanone and aryloxypheophenoxypyropionate herbicides.

PCBPB. Burton, J.D. Gronwald, J.W.; Somers, D.A.; Gengenbach, B.G.; Wyse, D.L. Duluth, Minn. : Academic Press. Pesticide biochemistry and physiology. May 1989. v. 34 (1). p. 76-85. Includes references. (NAL Call No.: DNAL SB951.P49).

1279

### Interaction of surfactants and reaction media on photolysis of chlorimuron and metsulfuron.

WEESA6. Harrison, S.K. Thomas, S.M. Champaign, Ill. : Weed Science Society of America. Laboratory experiments were conducted to determine the effects of nonionic surfactants and reaction media (water, glass, and corn leaf residue) on photolysis and subsequent phytotoxicity of chlorimuron and metsulfuron residues. Oxsorbic and octoxynol enhanced rates of chlorimuron and metsulfuron photolysis in aqueous solution and on glass slides compared to controls with no surfactant. Enhanced photolysis of chlorimuron by surfactants was greatest on glass, where 93 and 89% loss occurred after 48 h exposure to ultraviolet light in the presence of oxsorbic and octoxynol, respectively, compared to 38% loss with no surfactant. Similarly, surfactant-enhanced metsulfuron photolysis was greatest on glass with 37 and 67% loss after 48 h exposure in the presence of oxsorbic and octoxynol, respectively, compared to 9% loss

with no surfactant. Photolysis of herbicides deposited on corn leaf residue was significantly slower than that on glass or in aqueous media at all exposure times and metsulfuron photolysis on corn residue was enhanced by surfactants only after 144 h exposure. Bioassays confirmed that phytotoxicity of photolyzed herbicide residues was negatively correlated ( $r = -0.94$  for chlorimuron and  $r = -0.92$  for metsulfuron) with loss of parent herbicide as measured by liquid chromatography. Weed science. Nov 1990. v. 38 (6). p. 620-624. Includes references. (NAL Call No.: DNAL 79.8 W41).

1280

### Is polyamine biosynthesis a possible site of action of cinmethylin and artemisinin?

PCPB. DiTomaso, J.M. Duke, S.O. Duluth, Minn. : Academic Press. The effects of artemisinin, a naturally occurring sesquiterpene lactone, and the structurally similar herbicide cinmethylin on polyamine production were examined in seedlings of lettuce, corn, and pea. Although the antimalarial activity of artemisinin in animal cell cultures is associated with a dramatic reduction in the concentration of putrescine, results presented here indicate plants treated with growth-inhibiting concentrations of artemisinin or cinmethylin generally display only slightly reduced endogenous levels of putrescine and spermidine. In addition, simultaneous addition of 0.5 millimoles putrescine to artemisinin- or cinmethylin-treated excised corn and pea root cultures could not prevent a reduction in root growth. Similarly, the addition of putrescine to artemisinin-treated lettuce seedlings did not protect against artemisinin-induced chromosome decondensation. These results suggest that the primary biochemical activity of cinmethylin and artemisinin, which leads to inhibition in root growth, does not involve a block in the polyamine biosynthetic pathway. Pesticide biochemistry and physiology. Feb 1991. v. 39 (2). p. 158-167. ill. Includes references. (NAL Call No.: DNAL SB951.P49).

1281

### ISU patents corn gluten as weedkiller.

Cutler, K. Cedar Falls, IA : Freiberg Pub. Co. Seed industry. Oct 1991. v. 42 (9). p. 14, 38. (NAL Call No.: DNAL SB113.2.S45).

1282

### Kinetics of inhibition of acetyl-coenzyme a carboxylase by sethoxydim and haloxyfop.

PCPB. Burton, J.D. Gronwald, J.W.; Keith, R.A.; Somers, D.A.; Gengenbach, B.G.; Wyse, D.L. Duluth, Minn. : Academic Press. The mechanism of inhibition of acetyl-CoA carboxylase by sethoxydim and haloxyfop was examined using a semipurified enzyme preparation extracted from Black Mexican Sweet Maize (*Zea mays* L.) suspension-culture cells.

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As determined by SDS-PAGE and Western blotting, the enzyme preparation contained a major biotin-containing polypeptide (Mr 222,000) and a minor biotin-containing polypeptide (Mr 73,400). The kinetics of enzyme inhibition by sethoxydim and haloxyfop were determined for the substrates MgATP, HC03(-), and acetyl-CoA. Sethoxydim and haloxyfop were linear, noncompetitive inhibitors for the three substrates, and the pattern of inhibition was similar for both herbicides. The Kis values for sethoxydim were 1.9, 5.6, and 13.3 KM for acetyl-CoA, HC03(-) and MgATP, respectively. The Kis values for haloxyfop were 0.36, 0.87, and 2.89 micromoles for acetyl-CoA, HC03(-) and MgATP, respectively. For both herbicides, Kis < Kii for acetyl-CoA, whereas Kii < Kis for MgATP and HC03(-). The kinetic data suggest that the transcarboxylation reaction catalyzed by acetyl-CoA carboxylase (acetyl-CoA leads to malonyl-CoA) is more sensitive to inhibition than is the biotin carboxylation reaction. Kinetic analysis also indicated that sethoxydim and haloxyfop are reversible, mutually exclusive inhibitors of acetyl-CoA carboxylase. Pesticide biochemistry and physiology. Feb 1991. v. 39 (2). p. 100-109. ill. Includes references. (NAL Call No.: DNAL SB951.P49).

1283

### Managing pesticides on corn to avoid contaminating water.

Renner, K.A. Olsen, L.G.; Landis, J.N. East Lansing, Mich. : The Service. Extension bulletin : Water quality series. May 1991. (26, major rev.). 2 p. (NAL Call No.: DNAL TD224.M5E97).

1284

### Measuring uniformity of coverage in auger application of fungicides.

TAAEA. Endsley, J.C. Reid, J.F.; Bode, L.E. St. Joseph, Mich. : American Society of Agricultural Engineers. Transactions of the ASAE. Nov/Dec 1989. v. 32 (6). p. 1865-1870. ill. Includes references. (NAL Call No.: DNAL 290.9 AM32T).

1285

### Mechanisms of action of thiazole safeners.

Breaux, E.J. Hoobler, M.A.; Patanella, J.E.; Leyes, G.A. San Diego : Academic Press, c1989. Crop safeners for herbicides : development, uses, and mechanisms of action / edited by Kriton K. Hatzios and Robert E. Hoagland. p. 163-175. Includes references. (NAL Call No.: DNAL SB951.45.C76).

1286

### Metabolism, penetration, and partitioning of <sup>14</sup>C aldrin in aldrin-resistant and susceptible corn rootworms.

PCPB. Siegfried, B.D. Mullin, C.A. Duluth, Minn. : Academic Press. Pesticide biochemistry and physiology. Feb 1990. v. 36 (2). p. 135-146. Includes references. (NAL Call No.: DNAL SB951.P49).

1287

### Microbial degradation of some soil-applied insecticides, herbicides, and insecticide-herbicide combinations.

TECTAG. Reed, J.P. Keaster, A.J.; Kremer, R.J.; Kerr, H.D. New York, N.Y. : Springer-Verlag. Bulletin of environmental contamination and toxicology. May 1989. v. 42 (5). p. 676-681. Includes references. (NAL Call No.: DNAL RA1270.P35A1).

1288

### Microlysimeter soil columns for evaluating pesticide movement through the root zone.

JEVQAA. Fermanich, K.J. Daniel, T.C.; Lowery, B. Madison, Wis. : American Society of Agronomy. Field approaches to studying pesticide movement are subject to numerous variables of the environment, many of which are difficult and expensive to monitor. This study describes the design, construction, operation, and performance of intact microlysimeter soil (Plainfield loamy sand-mixed, mesic, Typic Udipsamment) columns used to examine the mobility of two insecticides through soil from two tillage plots (conventional-moldboard plow and no-till tillage). Field leaching conditions were approximated by simulating a moisture and temperature regime characteristic of a natural soil profile. Measured daily and seasonal temperature fluctuated according to a pattern characteristic of a field soil.

Evapotranspiration (ET) from the soil columns was 61% of the total water applied and was nearly equal to the ET measured (63%) from field lysimeters of this soil planted to corn (*Zea mays* L.). Variation in cumulative drainage was small, total drainage from all columns was within a range of 3.9 cm. There was no significant difference in the transport of bromide (conservative tracer) through columns from the two tillage plots. Bromide leachate loss was 62 and 63% of the amount applied for conventional-moldboard plow and no-till columns, respectively. Intact soil columns established in a microlysimeter fashion provided a means to compare the movement of agricultural chemicals under controlled conditions in the greenhouse that approximate conditions/processes in the field. Journal of environmental quality. Jan/Mar 1991. v. 20 (1). p. 189-195. Includes references. (NAL Call No.: DNAL QH540.J6).

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1289

**Mode of action of terbinafine in *Ustilago maydis* and characterization of resistant mutants.**  
PCBPB. Orth, A.B. Sisler, H.D. Duluth, Minn. : Academic Press. Pesticide biochemistry and physiology. May 1990. v. 37 (1). p. 53-63. ill. Includes references. (NAL Call No.: DNAL SB951.P49).

1290

**Mode of action of the dichloroacetamide antidote BAS 145-138 in corn.**  
PCBPB. Fuerst, E.P. Lamoureux, G.L.; Ahrens, W.H. Duluth, Minn. : Academic Press. The effect of BAS 145-138 (BAS) on metazachlor injury to corn and on the fate of <sup>14</sup>C metazachlor in corn seedlings was investigated. Corn shoot and root growth were inhibited by metazachlor. The antidote, BAS, increased corn shoot and root tolerance to metazachlor 10.7- and 7.6-fold, respectively. The antidotal activities of BAS and dichlormid were similar. Corn seedlings grown in soil treated with <sup>14</sup>C metazachlor +/- BAS were dissected at two growth stages prior to emergence and one growth stage immediately after emergence. Parent <sup>14</sup>C metazachlor was present as < 6% of the total radioactivity with an estimated tissue concentration of < 1 micromole in all tissues except the pericarp. This suggests that metazachlor was metabolized rapidly in both antidoted and control plants and that a very low concentration of metazachlor is required for phytotoxicity. BAS treatment reduced the concentration of parent metazachlor in the developing leaves by 82-84%. BAS treatment had three effects that contributed to the reduced amount of parent <sup>14</sup>C metazachlor in the developing leaves: (i) shoot absorption of <sup>14</sup>C metazachlor was slightly reduced by antidote treatment; (ii) the mobility of <sup>14</sup>C was reduced in antidoted seedlings, as indicated by the 63-86% decrease of total <sup>14</sup>C reaching the developing leaves; (iii) metabolism of metazachlor in growing tissues may have been stimulated by BAS, as suggested by the lower percentage of <sup>14</sup>C present as parent metazachlor. The coleoptile plays a critical role in corn shoot tolerance to metazachlor, since more metazachlor is absorbed through the coleoptile than through the mesocotyl and corn is more sensitive to metazachlor absorbed through the coleoptile than the mesocotyl. Reduced absorption and movement of metazachlor through the coleoptile apparently contribute to antidote activity. Results are consistent with the hypothesis that BAS protects corn from metazachlor injury by reducing levels of parent metazachlor present in sensitive a. Pesticide biochemistry and physiology. Feb 1991. v. 39 (2). p. 138-148. Includes references. (NAL Call No.: DNAL SB951.P49).

1291

**More prepackaged herbicide mixtures for field corn.**

Hahn, R. Batavia, N.Y. : Agricultural Div. of Coop Extension, Four Western Plain Counties, N.Y. State. Ag impact. Apr 1988. v. 15 (4). p. 5. ill. (NAL Call No.: DNAL S544.3.N7A45).

1292

**Movement of atrazine by water from application sites in conventional and no-tillage corn production.**

Foy, C.L. Hiranpradit, H. Blacksburg : Virginia Water Resources Research Center, VPI and State University, 1989. Pesticides in terrestrial and aquatic environments : proceedings of a national research conference, May 11-12, 1989 / edited by Diana L. Weigmann. p. 355-377. ill. Includes references. (NAL Call No.: DNAL QH545.P4P4844).

1293

**Nitrapyrin, terrazole, atrazine and simazine influence on denitrification and corn growth.**

JPNUDS. Somda, Z.C. Phatak, S.C.; Mills, H.A. New York, N.Y. : Marcel Dekker. Journal of plant nutrition. 1990. v. 13 (9). p. 1195-1208. Includes references. (NAL Call No.: DNAL QK867.J67).

1294

**Nitrapyrin, terrazole, atrazine, and simazine influence on nitrification and corn growth.**

JPNUDS. Somda, Z.C. Mills, H.A.; Phatak, S.C. New York, N.Y. : Marcel Dekker. Journal of plant nutrition. 1990. v. 13 (9). p. 1179-1193. Includes references. (NAL Call No.: DNAL QK867.J67).

1295

**Ozone-metolachlor interactions on corn (*Zea mays*), bean (*Phaseolus vulgaris*), and soybean (*Glycine max*).**

WETEE9. Mersie, W. Mebrahtu, T.; Rangappa, M. Champaign, Ill. : The Society. Weed technology : a journal of the Weed Science Society of America. Oct/Dec 1989. v. 3 (4). p. 650-653. Includes references. (NAL Call No.: DNAL SB610.W39).

1296

**Persistence and degradation of PP993 pyrethroid, fonofos, and chlorpyrifos in a Quebec cornfield's soil.**

BECTA6. Elhag, F.A. Yule, W.N.; Marshall, W.D. New York, N.Y. : Springer-Verlag. Bulletin of environmental contamination and toxicology. Feb 1989. v. 42 (2). p. 172-176. Includes

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references. (NAL Call No.: DNAL RA1270.P35A1).

1297

### Persistence of sulfonylureas in Pullman clay loam.

WETEE9. Wiese, A.F. Wood, M.L.; Chenault, E.W. Champaign, Ill. : The Society. Weed technology : a journal of the Weed Science Society of America. July 1988. v. 2 (3). p. 251-256. Includes references. (NAL Call No.: DNAL SB610.W39).

1298

### Pesticide mobility and persistence in microlysimeter soil columns from a tilled and no-tilled plot.

JEVQAA. Fermanich, K.J. Daniel, T.C. Madison, Wis. : American Society of Agronomy. Pesticide leaching losses under varying tillage systems, especially in sandy soils, is not clearly understood. This study compared the leaching and dissipation of two corn (*Zea mays L.*), <sup>14C</sup>-labeled, insecticides--carbofuran (2,3-dihydro-2,2-dimethyl-7-benzo-furanyl-methylcarbamate) and chlorpyrifos O,O-diethyl O-(trichloro-2-pyridyl) phosphorothioate --in sandy soil columns from conventional-moldboard plow (CN) and no-till (NT) tillage plots. Microlysimeters, utilizing intact soil columns from established tillage plots, were used to investigate pesticide mobility and dissipation under simulated field precipitation, drainage, and temperature patterns. Leachate from CN tillage columns receiving <sup>14C</sup>-carbofuran contained over two times more of the applied <sup>14C</sup> (17.9%) compared to NT columns (7.9%). The major portion (63%) of <sup>14C</sup>-carbofuran residues leached from CN columns was associated with a metabolite (unknown I) compared to 40% for NT columns. Slightly more (4.9% compared to 4.6%) as parent carbofuran leached from CN columns relative to NT. After 106 d of simulated field conditions, 4.0 and 7.8% of the applied parent <sup>14C</sup>-carbofuran was recovered from the soil of CN and NT columns, respectively. Average time to peak <sup>14C</sup>-carbofuran residue concentrations were retarded by 12 and 39 d for CN and NT columns, respectively, compared to time to peak concentrations of bromide. Less than 0.2% of the applied <sup>14C</sup>-chlorpyrifos leached from the soil columns. Differences in the physical, chemical, and/or biological characteristics between CN and NT tillage columns influenced the dissipation and mobility of carbofuran. Journal of environmental quality. Jan/Mar 1991. v. 20 (1). p. 195-202. Includes references. (NAL Call No.: DNAL QH540.J6).

1299

### Pesticide movement in a coastal plain soil under irrigation.

Ritter, W.F. Chirnside, A.E.M.; Scarborough, R.W. Denver, Colo. : U.S. Committee on Irrigation and Drainage, c1989. Toxic substances in agricultural water supply and

drainage : an int environ perspective : papers from the Second Pan-American Regional Conf of the Int Commission on Irrigation and Drainage, Ottawa, Canada, June 8-9, 1989. p. 389-400. Includes references. (NAL Call No.: DNAL TD428.A37T695 1989).

1300

### Pesticide use and water quality in Iowa.

Stoltenberg, D. Zahn, D.R. Ames, Iowa : The Service. PM - Iowa State University, Cooperative Extension Service. Nov 1990. (1394). 6 p. Includes references. (NAL Call No.: DNAL 275.29 IO9PA).

1301

### Preferential movement of pesticides and tracers in agricultural soils.

JIDEDH. Steenhuis, T.S. Staubitz, W.; Andreini, M.S.; Surface, J.; Richard, T.L.; Paulsen, R.; Pickering, N.B.; Hagerman, J.R.; Geohring, L.D. New York, N.Y. : American Society of Civil Engineers. Journal of irrigation and drainage engineering. Jan/Feb 1990. v. 116 (1). p. 50-66. ill. Includes references. (NAL Call No.: DNAL 290.9 AM3PS (IR)).

1302

### Protection of corn (*Zea mays*) and sorghum (*Sorghum bicolor*) from imazethapyr toxicity with antidotes.

WEESA6. Barrett, M. Champaign, Ill. : Weed Science Society of America. Antidotes were evaluated under greenhouse conditions for their ability to prevent injury to corn and sorghum from imazethapyr. Corn was more tolerant to imazethapyr and more effectively protected from imazethapyr toxicity than sorghum. Naphthalic anhydride (NA)3, CGA 92194, or flurazole treatment of corn seed reduced plant injury from preemergence applications of imazethapyr. Corn injury from postemergence applications of imazethapyr was decreased by seed treatment with NA or CGA 92194. Sorghum injury from preemergence applications of imazethapyr was not reduced by seed treatment with the antidotes. NA treatment of sorghum seed was the most effective antidote treatment for decreasing injury from postemergence application of imazethapyr but the level of sorghum protection was much less than that achieved with corn. Corn seedlings grown from NA-treated and untreated seed absorbed equal amounts of <sup>14C</sup> into the roots from nutrient solution containing <sup>14C</sup>-imazethapyr. The NA-treated corn plants translocated less of the absorbed <sup>14C</sup> to the shoots than the untreated plants. NA treatment of corn seeds increased the rate of imazethapyr conversion to soluble metabolites 2- and 10-fold in the corn seedling roots and shoots, respectively. The increased rate of imazethapyr metabolism in corn following NA seed treatment may be responsible for the protection from imazethapyr toxicity. Weed science. May 1989. v. 37 (3). p. 296-301.

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Includes references. (NAL Call No.: DNAL 79.8 W41).

1303

### Rainfall distribution under a corn canopy: implications for managing agrochemicals.

AGJOAT. Parkin, T.B. Codling, E.E. Madison, Wis. : American Society of Agronomy. A greater understanding of the spatial patterns of water inputs to soil will aid the development of agricultural practices to reduce leaching and runoff of agrochemicals. This study was initiated to investigate the process of stemflow, and to provide quantitative data on the distribution of rainfall under a corn (*Zea mays* L.) canopy. Rainfall distribution under the canopies of replicate conventional till corn plots was investigated by placing rainfall collectors at discrete locations within small 1.6-m by 0.76-m areas of the plots. Collection cups were also fixed around the stalks of individual corn plants to quantify stemflow. Results obtained from eight storm events in 1987 revealed that corn plants channel 19 to 49% of the total rain inputs down the stem to the base of the stalk. This stemflow plus the rainfall impinging directly in the planting furrow, accounted for approximately 42% of the total water inputs from a given storm event. These increased water inputs to the planting furrow may have implications in modeling solute leaching and runoff as well as to modifying current fertilizer and pesticide application methods. *Agronomy journal*. Nov/Dec 1990. v. 82 (6). p. 1166-1169. Includes references. (NAL Call No.: DNAL 4 AM34P).

1304

### A rapid, sensitive soil bioassay for sulfonylurea herbicides.

WEESA6. Sunderland, S.L. Santelmann, P.W.; Baughman, T.A. Champaign, Ill. : Weed Science Society of America. The concentration of three sulfonylurea herbicides in soil was determined by a modified petri dish bioassay procedure. The method involved planting pregerminated seed of selected species in petri dishes containing 65 to 100 g of treated soil and measuring the radicle lengths after 24 h. Chlorimuron was detected in two soils at 0.002 pg g<sup>-1</sup> using either corn, sorghum, or sicklepod as the assay species. Chlorsulfuron and CGA-131036 were detected in soils at 0.001 microgram g<sup>-1</sup> using corn, and chlorsulfuron was detected at the same level using sicklepod. In contrast to other methods, the bioassay procedure described could be completed in 48 h, including pregermination of the seed, growth of the plants on treated soil, and plant measurements. *Weed science*. Apr/June 1991. v. 39 (2). p. 296-298. Includes references. (NAL Call No.: DNAL 79.8 W41).

1305

### Reduction of imazaquin injury to corn (*Zea mays*) and sorghum (*Sorghum bicolor*) with antidotes.

WEESA6. Barrett, M. Champaign, Ill. : Weed Science Society of America. Antidotes were evaluated for their ability to prevent corn and sorghum injury caused by imazaquin. Plant injury was reduced in both preemergence and early postemergence imazaquin applications. Naphthalic anhydride (NA)3 seed treatment was the most consistent compound in reducing the imazaquin injury. Seed treatment with CGA 92194 or flurazone also gave injury protection to corn and sorghum, while soil treatment with dichlorimid provided the least protection from imazaquin injury. Treatment with the antidotes did not affect the acetolactate synthase (ALS)3 (EC4.1.3.18) activity in corn or sorghum tissues. Imazaquin treatments decreased extractable ALS activity but this decrease was eliminated, partially or totally, by the most effective antidotes. Antidote treatments had little effect on absorption and distribution of <sup>14</sup>C in plants growing in soil treated with <sup>14</sup>C-imazaquin. Antidote treatments increased the metabolism of <sup>14</sup>C-imazaquin to both soluble and unextractable <sup>14</sup>C after 24 h of exposure. The increased rate of imazaquin conversion to less toxic metabolites when antidotes were used resulted in a reduction in imazaquin injury to corn and sorghum. *Weed science*. Jan 1989. v. 37 (1). p. 34-41. Includes references. (NAL Call No.: DNAL 79.8 W41).

1306

### Residual effects of CGA-131036 and chlorsulfuron on spring-sown rotational crops.

WEESA6. Friesen, G.H. Wall, D.A. Champaign, Ill. : Weed Science Society of America. Response of flax, canola, field pea, sunflower, field corn, lentils, and common buckwheat to soil residues of CGA-131036 and chlorsulfuron applied at 22 g ai ha<sup>-1</sup> was determined on two soil types at Morden, Manitoba. On a fine sandy loam with a pH of 7.4 and 4.5% organic matter, the length of time required before crops showed no phytotoxicity from CGA-131036 residues was: sunflower 4 yr; canola and common buckwheat 3 yr; flax 2 yr; field pea and field corn 1 yr. On a clay loam with a pH of 6.5 and 5.3% organic matter, the corresponding duration was: lentil, canola, and sunflower 3 yr; flax and field pea 1 yr. Chlorsulfuron residues persisted somewhat longer than CGA-131036 residues on the sandy loam but not on the clay loam. *Weed science*. Apr/June 1991. v. 39 (2). p. 280-283. Includes references. (NAL Call No.: DNAL 79.8 W41).

1307

### Response of corn (*Zea mays*) cultivars to imazaquin.

WEESA6. Renner, K.A. Meggitt, W.F.; Penner, D. Champaign, Ill. : Weed Science Society of America. Corn cultivars differed in their response to imazaquin applied from 35 to 280 g

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ai/ha, as measured by shoot length. No cultivar was tolerant to all imazaquin application rates. There was less corn injury from imazaquin in studies conducted during the second and third years of research than in the first year. Preplant-incorporated applications caused significantly more injury than preemergence applications in two out of three studies. Lack of rainfall in 1985 and 1987 may have limited movement of imazaquin in the soil profile, which resulted in preemergence applications of imazaquin, causing very little corn injury. In all years of research, 35 g/ha of imazaquin incorporated in the top 6 cm of the soil profile resulted in 17 to 33% reduction in corn height 28 days after planting, when averaged across all the corn cultivars. Significant yield reductions (LSD = 0.10) of 45, 19, and 18% occurred in 1987 from preplant-incorporated applications of 140, 70, and 35 g/ha, respectively, which had reduced corn height 46, 23, and 19%, respectively, when measured 28 days after planting. *Weed science*. Sept 1988. v. 36 (5). p. 625-628. Includes references. (NAL Call No.: DNAL 79.8 W41).

1308

**Response of corn (*Zea mays*), soybean (*Glycine max*), and several weed species to dark-applied photodynamic herbicide modulators.**  
WEESA6. Mayasich, J.M. Mayasich, S.A.; Rebeiz, C.A. Champaign, Ill. : Weed Science Society of America. The photodynamic herbicidal performance of delta-aminolevulinic acid in combination with four chlorophyll biosynthesis modulators was evaluated under greenhouse conditions, using corn, soybean, and ten weed species. Treatments resulted in accumulation of various amounts of protoporphyrin IX and of monovinyl and divinyl Mg-protoporphyrin IX and protochlorophyllide. Accumulation of these tetrapyrroles was accompanied by various degrees of photodynamic injury, depending on treatment, plant species, and somewhat the modulator. The lower photodynamic susceptibility of dark monovinyl/light monovinyl and dark divinyl/light divinyl plants toward the accumulation of monovinyl and divinyl protochlorophyllide, respectively, was attributed to their greater abilities to metabolize these protochlorophyllides in the light. On the other hand, the higher photodynamic susceptibility of the dark monovinyl/light divinyl weed species toward the accumulation of monovinyl protochlorophyllide was attributed to their lower ability to metabolize the accumulated monovinyl protochlorophyllide in the light. *Weed science*. Jan 1990. v. 38 (1). p. 10-15. Includes references. (NAL Call No.: DNAL 79.8 W41).

1309

**Response of different plants to ammonium and nitrate as sources of nitrogen with application of fungicides.**  
JPNUDS. Feng, J. Barker, A.V. New York, N.Y. : Marcel Dekker. *Journal of plant nutrition*. 1990. v. 13 (5). p. 495-512. Includes

references. (NAL Call No.: DNAL QK867.J67).

1310

### **Rotational crop response to repeated applications of norflurazon.**

WETEE9. Keeling, J.W. Lloyd, R.W.; Abernathy, J.R. Champaign, Ill. : The Society. *Weed technology : a journal of the Weed Science Society of America*. Jan/Mar 1989. v. 3 (1). p. 122-125. Includes references. (NAL Call No.: DNAL SB610.W39).

1311

**Selection and characterization of sethoxydim-tolerant maize tissue cultures.**  
PLPHA. Parker, W.B. Somers, D.A.; Wyse, D.L.; Keith, R.A.; Burton, J.D.; Gronwald, J.W.; Gengenbach, B.G. Rockville, Md. : American Society of Plant Physiologists. 'Black Mexican Sweet' (BMS) maize (*Zea mays* L.) tissue cultures were selected for tolerance to sethoxydim. Sethoxydim, a cyclohexanone, and haloxyfop, an aryloxyphenoxypropionate, exert herbicidal activity on most monocots including maize by inhibiting acetyl-coenzyme A carboxylase (ACCase). Selected line B10S grew on medium containing 10 micromolar sethoxydim. Lines B50S and B100S were subsequent selections from B10S that grew on medium containing 50 and 100 micromolar sethoxydim, respectively. Growth rates of BMS, B10S, B50S, and B100S were similar in the absence of herbicide. Herbicide concentrations reducing growth by 50% were 0.6, 4.5, 35, and 26 micromolar sethoxydim and 0.06, 0.5, 5.4, and 1.8 micromolar haloxyfop for BMS, B10S, B50S, and B100S, respectively. Sethoxydim and haloxyfop concentrations that inhibited ACCase by 50% were similar for BMS, B10S, B50S, and B100S. However, ACCase activities were 6.1, 10.7, 16.1, and 11.4 nmol HCO<sub>3</sub><sup>-</sup> incorporated per milligram of protein per minute in extracts of BMS, B10S, B50S, and B100S, respectively, suggesting that increased wild-type ACCase activity conferred herbicide tolerance. Incorporation of <sup>14</sup>C acetate into the nonpolar lipid fraction was higher for B50S than for BMS in the absence of sethoxydim providing further evidence for an increase in ACCase activity in the selected line. In the presence of 5 micromolar sethoxydim, <sup>14</sup>C acetate incorporation by B50S was similar to that for untreated BMS. The levels of a biotin-containing polypeptide (about 220,000 molecular weight), presumably the ACCase subunit, were increased in the tissue cultures that exhibited elevated ACCase activity indicating overproduction of the ACCase enzyme. *Plant physiology*. Apr 1990. v. 92 (4). p. 1220-1225. Illus. Includes references. (NAL Call No.: DNAL 450 P692).

## (PESTICIDES - GENERAL)

1312

### Sulfometuron persistence and movement in soil and water in North Dakota.

JEVQAA. Lym, R.G. Swenson, O.R. Madison, Wis. : American Society of Agronomy. The lateral movement, soil persistence and aqueous hydrolysis of sulfometuron 12-( (4,6-dimethyl-2-pyrimidinyl)amino carbonyl ) amino sulfonyl)-benzoic acid was evaluated. Sulfometuron applied at 140 g a.i. ha<sup>-1</sup> from slopes to nontarget areas was minimal and was not detected in the 0-to-30-cm-soil depth, when sampled up to 120 cm downslope from the treated area on 2, 8, or 16% slopes 1 yr after treatment. The highest sulfometuron concentration found downslope from the treated area was less than 1 microgram kg<sup>-1</sup> regardless of the slope. Sulfometuron moved beyond the soil column (70 cm deep) in Fairdale loam fine-loamy, mixed (calcareous), frigid, Mollic Udifluvents, Felor silty clay loam (fine-loamy, mixed, Typic Agriborolls), and Barnes stony loam (fine-loamy, mixed, Udic Haploborolls) soils when leached with 45.7 cm of water for 48 h compared to only 35 to 50 cm deep when leached with the same amount of water over 9 wk. Sulfometuron degradation increased as soil temperature and moisture increased. Sulfometuron was detected for an average of 429 d in Felor silty clay loam at pH 6.1, 8 degrees C, and 45% field capacity but only 218 d in the same soil at 90% field capacity and 16 degrees C. Degradation was slower in Renshaw and Sioux sandy loam (undifferentiated soil mixture) fine-loamy over sandy or sandy skeletal mixed Udic Haploborolls and sandy-skeletal mixed Udotheutic Haploborolls with a pH of 7.4 and averaged >700 d, regardless of environmental conditions. Sulfometuron hydrolysis was similar regardless of solution pH with an average of 63% 14C-sulfometuron remaining after 28 d in water at pH 5, 7, and 9. The average half-life of 14C-sulfometuron was 31 and 65 d in ultraviolet-irradiated and dark control samples, respectively. Journal of environmental quality. Jan/Mar 1991. v. 20 (1). p. 209-215. Includes references. (NAL Call No.: DNAL QH540.U6).

structure-activity relationships. The order of activity at C-5 of the pyrazole ring was CF<sub>3</sub> > Cl approximately equal to Br > I. The order of activity involving substitution on the carboxamide moiety was cyclopropyl approximately equal to methyl > dimethyl > ethyl > isopropyl. Substitution on the benzene ring did not result in any major increase in activity when compared with the corresponding phenyl analogue. Journal of agricultural and food chemistry. Feb 1990. v. 38 (2). p. 541-544. Includes references. (NAL Call No.: DNAL 381 J8223).

1314

### Synthesis and herbicidal properties of substituted 1,4-dihydro-1,2,4-benzotriazines.

JAFCAU. Waldrep, T.W. Rieder, B.J.; Thibault, T.D.; Canada, E.J. Washington, D.C. : American Chemical Society. A series of 1,4-dihydro-1,2,4-benzotriazines exhibits slight to moderate herbicidal activity in preemergence and postemergence tests. Postemergence applications of these benzotriazines at 4 lb/acre provided good control of large crabgrass, foxtail millet, redroot pigweed, wild mustard, and tomato, but no selectivity was observed among the various plant species. At 4 lb/acre preemergence, corn, wheat, rice, cotton, and soybean show tolerance, while large crabgrass, foxtail millet, redroot pigweed, common lambsquarters, velvetleaf, and jimsonweed were killed or severely injured. A total of 36 analogues was synthesized, and their herbicidal activities were determined to examine the structure-activity relationships. In general, we found that, among the variations investigated, cyano substitution on the benzo portion, small alkyl at the 1-position, and hydrogens at the 3- and 4-positions led to the most active herbicides. Journal of agricultural and food chemistry. Feb 1991. v. 39 (2). p. 392-395. Includes references. (NAL Call No.: DNAL 381 J8223).

1315

### Tolerance of corn, proso millet and safflower to FMC-57020.

WSWPA. Anderson, R.L. Reno, Nev. : The Society. Proceedings - Western Society of Weed Science. Meeting held on March 8-10, 1988, Fresno, California. 1988. v. 41. p. 130-132. (NAL Call No.: DNAL 79.9 W52).

1316

### Tolerance of corn (*Zea mays*) to Sethoxydim applied with precision postemergence-directed sprayer equipment.

WETEE9. Klepp, C.D. Harvey, R.G. Champaign, Ill. : The Society. Weed technology : a journal of the Weed Science Society of America. Oct/Dec 1989. v. 3 (4). p. 663-667. ill. Includes references. (NAL Call No.: DNAL SB610.W39).

**(PESTICIDES - GENERAL)**

1317

**Tractor-mounted rotary dispenser for artificially infesting whorl-stage corn with larvae of *Spodoptera frugiperda* (Lepidoptera: Noctuidae).**  
JEENAI, Sumner, H.R. Gross, H.R. Lanham, Md. : Entomological Society of America. A rotating dispenser system for artificially infesting whorl-stage corn (*Zea mays L.*) with larvae of the fall armyworm, *Spodoptera frugiperda* (J. E. Smith), was designed, developed, and evaluated. The system uniformly dispenses larvae up to a density averaging 76 larvae per g of corncob grits, while rotating at 75 rpm. The mortality of larvae tumbled in the hopper with grits was higher than the mortality of those not tumbled, but mortality did not differ significantly among larvae tumbled for 3, 10, or 20 min. Following application, the mean number of larvae recovered per plant, the mean percentage of plants infested, the mean percentage of plants infested with multiple larvae, and the mean percentage of damaged plants increased progressively and significantly as the density of dispensed fall armyworm larvae was increased from 1 to 16 per plant. The application system probably can be used to convey the larvae of numerous lepidopterous species on a variety of row crops and also may be adaptable for use in the augmentation of biological control agents. *Journal of economic entomology*. June 1991. v. 84 (3). p. 1010-1014. Includes references. (NAL Call No.: DNAL 421 J822).

1321

**1992 weed control guide for field crops.**  
MUCBA. Renner, K.A. Kells, J.J. East Lansing, Mich. : The Service. Extension bulletin E - Cooperative Extension Service, Michigan State University. Nov 1991. (434,rev.). 126 p. (NAL Call No.: DNAL 275.29 M58B).

1318

**Translational alterations in maize leaves responding to pathogen infection, paraquat treatment, or heat shock.**  
PLPFA. Wu, C.H. Warren, H.L.; Sitaraman, K.; Tsai, C.Y. Rockville, Md. : American Society of Plant Physiologists. *Plant physiology*. Apr 1988. v. 86 (4). p. 1323-1329. ill. Includes references. (NAL Call No.: DNAL 450 P692).

1319

**Utilization of starch matrices for development of corn rootworm specific semiochemical/insecticide delivery systems potential for adult suppression /by Thomas J. Weissling.**  
Weissling, Thomas J. 1990. Thesis (Ph.D.)--University of Nebraska--Lincoln, 1990. iv, 180 leaves : ill. ; 28 cm. Includes bibliographical references. (NAL Call No.: NBU LD3656.5 1990 W357).

1320

**Wheat tolerance to fenoxaprop-ethyl, a grass herbicide.**  
PNWSB. Devlin, R.M. Zbiec, I.I. College Park, Md. : The Society. Proceedings of the annual meeting - Northeastern Weed Science Society. 1990. v. 44. p. 1-5. Includes references. (NAL Call No.: DNAL 79.9 N814).

# SOIL BIOLOGY

1322

## Alfalfa autotoxic fraction characterization and initial separation.

CRPSAY. Hall, M.H. Henderlong, P.R. Madison, Wis. : Crop Science Society of America. Alfalfa (*Medicago sativa L.*) has been reported as having autotoxic or autoallelopathic characteristics, but the plant fraction containing the autotoxic material and the responsible compound have not been isolated or identified. Greenhouse and laboratory studies were conducted to: (i) determine if 'Vanguard' alfalfa exhibits autotoxicity, (ii) determine which plant fraction contains the autotoxic material, and (iii) separate the autotoxic fraction using paper chromatography procedures. In greenhouse studies, alfalfa plant material reduced alfalfa emergence by an average of 87 and 62% in a Kokomo silty loam soil (fine, mixed mesic, Typic Argiaquoll) previously cropped with alfalfa and corn (*Zea mays L.*), respectively. Incubating the soil and plant material under two contrasting moisture regimes did not alter the inhibitory activity. However, autoclaving the soil and plant material negated the autotoxic response. Laboratory studies indicate that the autotoxic compound was contained within the water-extractable alfalfa fraction, and was not the direct result of microbial activity, although microbial activity may increase the dissipation of the compound. Ascending paper chromatographic separation indicated that the autotoxic compound had an R<sub>f</sub> characterization similar to phenolic acid; however, phenolic-absorbent polyvinylpoly-pryrrolidone did not affect the autotoxic response. The results indicate that alfalfa contains a water-soluble autotoxic compound that has characteristics indicative of a phenolic compound. Crop science. Mar/Apr. 1989. v. 29 (2). p. 425-428. Includes references. (NAL Call No.: DNAL 64.8 C883).

1323

## Ammonia volatilization from urea as influenced by soil temperature, soil water content, and nitrification and hydrolysis inhibitors.

SSJD4. Clay, D.E. Malzer, G.L.; Anderson, J.L. Madison, Wis. : The Society. Residue cover influences temperature and water gradients in the soil profile. Changes in the physical environment of the soil influence NH<sub>3</sub> volatilization from urea-containing fertilizers. Field and laboratory experiments were conducted to investigate the influence of residue-cover-induced changes in soil water and temperature on NH<sub>3</sub> volatilization as impacted by urea treatment with a nitrification and urease inhibitor. Fertilizer treatments were urea, urea plus dicyandiamide (DCD), urea plus N-(n-butyl)thiophosphoric triamide (NBPT), and urea plus NBPT and DCD. Following fertilizer application, the soil was either left bare or covered with corn (*Zea mays L.*) residue. Every 3 h over a 4-d period, water potential, soil temperature, CO<sub>2</sub> production, and NH<sub>3</sub> volatilization were measured. The influence of fertilizer treatments on soil pH was determined in a laboratory incubation experiment conducted over 8 d under controlled environmental

conditions. Treatments were similar to the field experiment, with NH<sub>3</sub> volatilization, pH, and CO<sub>2</sub> production measured daily. The NH<sub>3</sub>-volatilization rate in the field was highest 2 d after urea application at a time that corresponded with daily maximum soil temperature and decreasing soil water content. Residue cover reduced NH<sub>3</sub> volatilization. Volatilization of NH<sub>3</sub> as a result of urea application was not increased when urea was treated with DCD. Ammonia volatilization as a result of urea treatment with NBPT was reduced by 100 times over untreated urea. During an incubation experiment, soil pH increased from 6.5 to 7.2 in the urea-NBPT, and from 6.5 to 9.0 in the urea and urea-DCD treatments. Associated with the pH increase in the urea-NBPT treatment was a reduction in CO<sub>2</sub> production when compared with the untreated soil. Soil Science Society of America journal. Jan/Feb 1990. v. 54 (1). p. 263-266. Includes references. (NAL Call No.: DNAL 56.9 S03).

1324

## Earthworm effects on corn residue breakdown and infiltration.

SSJD4. Zachmann, J.E. Linden, D.R. Madison, Wis. : The Society. Earthworm (*Lumbricus rubellus* Hoffmeister) activity in the field has been implicated in increased rates of residue turnover, surface soil stabilization, and increased infiltration rates due to macroporous flow. A growth-chamber study was conducted to evaluate some of the field variables associated with *L. rubellus* activity and tillage systems. Polyethylene buckets packed with sieved soil had either surface-applied, incorporated, or no corn (*Zea mays L.*) residue, each with or without worms. Treatments were subjected to diurnal temperature and light sequences, and periodic additions of water were made over 60 d to maintain near-optimum moisture conditions. Corn was grown in the cultures for an additional 30 d and was harvested before a small amount of concentrated Br solution was sprayed on the soil surface. Cultures were then subjected to simulated rainfall. Corn residue in the surface-residue treatment with worms degraded 30% faster than in the no-worm control. Plant growth and N content were not affected by the presence of worms. Burrows and casts formed under surface residue were greater in number and stability than in other worm/residue combinations. The surface-residue treatment with worms reduced runoff and caused incoming water to bypass the surface soil matrix, moving small quantities Br to significantly greater depths than in other treatments. Depth of peak Br concentration was greater in no-residue treatments than in surface-residue/worm or incorporated-residue/worm or no-worm treatments, indicating a substantial difference in the displacement of surface-applied Br during rainfall. *L. rubellus* may alter the water balance of field soils while simultaneously hastening decomposition of the residue mat. Soil Science Society of America journal. Nov/Dec 1989. v. 53 (6). p. 1846-1849. Includes references. (NAL Call No.: DNAL 56.9 S03).

## (SOIL BIOLOGY)

1325

### Impacts of cropping intensity on carbon and nitrogen mineralization under no-till dryland agroecosystems.

AGJOAT. Wood, C.W. Westfall, D.G.; Peterson, G.A.; Burke, I.C. Madison, Wis. : American Society of Agronomy. Imposing no-till and lower fallow frequency on soils previously managed under tilled and frequent fallow systems may alter soil organic C and N concentrations and activity (potential mineralization). This study was conducted to determine the effect of cropping intensity (number of crops/unit time) on surface soil (0-5 cm) C and N activity after 3.5 yr of no-till management. The effect was examined across three soil catenas in the West Central Great Plains that were previously managed under tilled and alternate crop-fallow systems for >50 yr. Production systems included the less intensive wheat (*Triticum aestivum* L.)-fallow (WF), and the more intensive wheat-corn (*Zea mays* L.)-millet (*Panicum miliaceum* L.)-fallow (WCMF). After 3.5 yr of no-till, potential C and N mineralization, C turnover, and relative N mineralization were 61, 39, 36, and 43% greater under WCMF than WF, respectively. Footslope soils had greater potential C and N mineralization than summit or backslope soils, but lower C turnover and relative N mineralization, which was probably due to long-term accumulation of recalcitrant C and N compounds. Differences in potential soil C and N activity between cropping systems were due to greater surface organic C concentrations under WCMF (mean = 10.88 g kg<sup>-1</sup>) than WF (mean = 9.60 g kg<sup>-1</sup>), which were related to cumulative plant residue additions over the 3.5-yr-study period (mean = 9.01 and 7.04 Mg ha<sup>-1</sup> for WCMF and WF, respectively). It appears that potentially active surface soil organic C and N are very sensitive to change in cultural practices, and are increased by greater cropping intensity under no-till management. *Agronomy journal*. Nov/Dec 1990. v. 82 (6). p. 1115-1120. Includes references. (NAL Call No.: DNAL 4 AM34P).

1326

### Influence of nitrogen fertilization, tillage and residue management on a soil nitrogen mineralization index.

CSOSA2. Clay, D.E. Clapp, C.E.; Molina, J.A.E.; Dowdy, R.H. New York, N.Y. : Marcel Dekker. Communications in soil science and plant analysis. 1990. v. 21 (3/4). p. 323-335. Includes references. (NAL Call No.: DNAL S590.C63).

1327

### Nitrapyrin, terrazole, atrazine and simazine influence on denitrification and corn growth.

JPNUDS. Somda, Z.C. Phatak, S.C.; Mills, H.A. New York, N.Y. : Marcel Dekker. *Journal of plant nutrition*. 1990. v. 13 (9). p. 1195-1208. Includes references. (NAL Call No.: DNAL QK867.J67).

1328

**Nitrapyrin, terrazole, atrazine, and simazine influence on nitrification and corn growth.**  
JPNUDS. Somda, Z.C. Mills, H.A.; Phatak, S.C. New York, N.Y. : Marcel Dekker. *Journal of plant nutrition*. 1990. v. 13 (9). p. 1179-1193. Includes references. (NAL Call No.: DNAL QK867.J67).

1329

### Nitrogen management and nitrification inhibitor effects on nitrogen-15 urea. I. Yield and fertilizer use efficiency.

SSJD4. Walters, D.T. Malzer, G.L. Madison, Wis. : The Society. Nitrification inhibitors (NI) are sometimes recommended for use with ammoniacal fertilizers in corn (*Zea mays* L.) production to improve fertilizer N use efficiency (FUE). The objectives of this experiment were to evaluate the effects of the NI nitrapyrin 2-chloro-6-(trichloromethyl) pyridine application on yield and FUE of irrigated corn, and to monitor the fate of a single application of 15N-enriched urea during a multiyear period in both soil and plant. Treatments included a factorial combination of two N rates (90 or 180 kg urea-N ha<sup>-1</sup> yr<sup>-1</sup>) applied during a 3-yr period, with or without a NI and with or without incorporation, plus a zero-N control. Twenty-seven nonweighing lysimeters were used to quantify leaching load. Treatment effects on yield and FUE differed each year due to interactions of climate and N-management variables. Nonincorporated urea + NI reduced grain yield when leaching load was low and increased yield at the 90 kg ha<sup>-1</sup> N rate when leaching load was high. Maximum FUE occurred at the 90 kg ha<sup>-1</sup> N rate when leaching load was low. The NI increased FUE only at the 90 kg ha<sup>-1</sup> N rate when leaching load was high. Incorporation of urea + NI reduced plant recovery of fertilizer-derived N (FDN) in the year of application, but resulted in increased uptake of residual FDN in subsequent years. Incorporation of NI with moderate N rates coupled with conservative irrigation management should reduce the risk of yield loss and minimize NO<sub>3</sub> movement to groundwater. *Soil Science Society of America journal*. Jan/Feb 1990. v. 54 (1). p. 115-122. Includes references. (NAL Call No.: DNAL 56.9 S03).

1330

### Nitrogen management and nitrification inhibitor effects on nitrogen-15 urea. II. Nitrogen leaching and balance.

SSJD4. Walters, D.T. Malzer, G.L. Madison, Wis. : The Society. Nitrification inhibitors (NI) may reduce N leaching losses, and should have the greatest effect on sandy soils where leaching potential is high. This study used 27 lysimeters to evaluate the effect of a NI, nitrapyrin 2-chloro-6-(trichloromethyl) pyridine, on soil water percolation (SWP) and N leaching losses from an irrigated sandy loam soil (Typic Hapludoll) planted with corn (*Zea mays* L.), and monitor the fate of a single

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application of 15N-enriched urea over a multiyear period. Urea was applied at 90 and 180 kg N ha<sup>-1</sup> yr<sup>-1</sup> for a 3-yr period, with and without NI, and with and without incorporation. Urea + NI reduced SWP between planting and silking in 2 out of 3 yr when growing degree days (GDD) were high. After silking, SWP was reduced when urea + NI was incorporated and leaching load was high. A twofold increase in N rate resulted in an average of 3.4 times more N leached over 3 yr. The NI influenced time of N loss but not total N loss. Leaching losses of fertilizer-derived N (FDN) were delayed 25 to 50 d when urea + NI were incorporated. The leaching load required to reach the maximum rate of FDN loss was higher with urea + NI. Leaching losses of fertilizer N were three times greater when determined by the difference method than by isotope-ratio analysis. Differing results with these two calculations are attributed to isotope dilution with indigenous soil N as a result of microbial activity. Nitrification inhibitors may reduce the potential for nonpoint-source pollution by delaying NO<sub>3</sub> leaching, but will be most effective if coupled with proper N rates and conservative irrigation water management. Soil Science Society of America journal. Jan/Feb 1990. v. 54 (1). p. 122-130. Includes references. (NAL Call No.: DNAL 56.9 S03).

and time when these microbial activities are examined in tillage studies, and suggest that N losses under NT should exceed those under CT. Soil Science Society of America journal. Nov/Dec 1990. v. 54 (6). p. 1602-1608. Includes references. (NAL Call No.: DNAL 56.9 S03).

### 1332

#### **Soil microbial biomass and organic component alterations in a no-tillage chronosequence.**

SSJD4. Staley, T.E. Edwards, W.M.; Scott, C.L.; Owens, L.B. Madison, Wis. : The Society. A no-tillage (NT) chronosequence that had been continuously cropped to maize (*Zea mays L.*) for 0, 1, 2, 4, 7, 9, 15, or 20 yr on a Westmorelandsilt loam (fine-loamy, mixed, mesic Ultic Hapludalf was examined for differences in microbial biomass, and soil organic C, N, P, and S. In the plowzone of the NT sites, biomass-C, total C (TC), soluble organic C (SOC), total Kjeldahl N (TKN organic P (OP), and organic S (OS) levels were generally greater in the soil surface (0 to 7.5 cm) layers than in the 7.5- to 15-cm layers. In contrast, biomass-C under conventional tillage (CT or 0-yr NT site) in the soil surface layer was approximately 50% of that in the 7.5 to 15-cm layer, whereas levels of the organic components were nearly identical. Biomass-C and organic component levels in the soil surface layers under NT were from 27 to 83% greater than those under CT. Opposite tillage method effects on these properties were usually found for deeper soil layers. Soil organic components, but not biomass-C, were significantly (p less than or equal to 0.05) related to years under NT in the soil surface layer. Only biomass-C was significantly (p less than or equal to 0.10) related to years under NT in deeper soil layers. When just "typical(i.e., nonmanured, moderate N-rate)" sites were included in the regression models, only biomass-C and SOC reservoir contents (total to 45 cm) varied significantly (p less than or equal to 0.10) with years under NT. Soil biomass-C reached a maximum (786 kg.ha furrow-slice-1) in the soil surface layer after only 1 yr under NT, approaching a level nearly equivalent to that under an improved pasture, then equilibrated in about 10 yr to a level approximately 30% greater than that under CT. These observations suggest that continual NT induces a predictable dynamic in soil biomass-C, but not soil organic components, that is generally insensitive to a range of management differences. As a consequence, management practices designed to improve nutrient use-effi. Soil Science Society of America journal. July/Aug 1988. v. 52 (4). p. 998-1005. maps. Includes references. (NAL Call No.: DNAL 56.9 S03).

### 1331

#### **Soil denitrification and nitrification potentials during the growing season relative to tillage.**

SSJD4. Staley, T.E. Caskey, W.H.; Boyer, D.G. Madison, Wis. : The Society. Soil management practice, through the alteration of various biological processes, can have a profound effect on nutrient availability to crops. During the growing season, the effect of no-tillage (NT) or conventional tillage (CT), location (between or within row), and N rate (0 or 56 kg N ha<sup>-1</sup>) on soil potential denitrification activity (PDA) and potential nitrification activity (PNA) was investigated. A Gilpin silt loam (fine-loamy, mixed, mesic Typic Hapludults) was selected and maize (*Zea mays L.*) was planted. For both PDA and PNA, most of the activity was concentrated in the soil surface (0-3.8-cm) layer, especially under NT, and decreased to barely detectable levels in the deepest (15-30-cm) layer examined. Significant main effects were found for tillage, season, and location for PDA in the soil surface layer. Tillage interacted only with season, resulting in an increase in PDA under NT, and a lack of response under CT, during the growing season in both the soil surface and the 3.8- to 7.6-cm layers. For PNA in the soil surface layer, significant main effects were found for all treatments. Only location interacted with tillage, resulting in a 50% increase in PNA from within rows to between rows under NT, and a lack of response under CT. In the 3.8- to 7.6-cm layer, the lowest order interaction was significant. In the 7.6- to 15-cm layer, PNA increased more rapidly under CT than NT during the growing season. These results demonstrate the importance of considering spatial distribution

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1333

### Soil microbial populations and activities under conventional and organic management.

JEVQAA. Fraser, D.G. Doran, J.W.; Sahs, W.W.; Lesoing, G.W. Madison, Wis. : American Society of Agronomy. Evaluation of microbial populations and activities, and their relationship to N cycling in soils under organic and conventional farm management was conducted in eastern Nebraska in 1981 and 1982, on an experiment initiated in 1975. The experimental treatments consisted of 3 x 4 factorial with three management systems (organic, fertilizer only, and fertilizer plus herbicide) for a 4-yr grain/legume crop rotation plus one treatment of continuous corn (*Zea mays L.*) receiving fertilizer, herbicide, and insecticide including one subplot without insecticide). Soil physical, chemical, and microbiological characterization were made at soil depth intervals of 0 to 7.5, 7.5 to 15, and 15 to 30 cm. Soil chemical properties were significantly influenced by chemical management, primarily the application of beef (*Bos taurus*) feedlot manure in the organic management system. Total organic C, Kjeldahl N, and potentially mineralizable N in manure-amended surface soils (0-7.5 cm) were 22 to 40% greater than nonmanured soils receiving fertilizer and/or herbicide. Soluble P levels were eightfold greater in manure-amended surface soils, and soil nitrate levels after harvest in 1981 were two- to threefold greater to a depth of 30 cm than nonmanured chemical treatments. Soil microbial biomass, bacterial and fungal counts, dehydrogenase activity, and CO<sub>2</sub> evolution were greater in soils planted to oat/clover (*Avena sativa L./Trifolium pratense L. + Melilotus officinalis Lam.*) and treatments receiving manure. Increases in microbial populations and their activities paralleled increases in soil organic C content, Kjeldahl N, and water-filled pore space. Differences in N<sub>2</sub> fixation and denitrification between crops and management systems were minimal-possibly resulting from suboptimal water availability at midseason sampling. No significant differences were found in measured soil physical, chemical, or biological properties due to herbicide or insecticide at field application rates. Journal of environmental quality. Oct/Dec 1988. v. 17 (4). p. 585-590. Includes references. (NAL Call No.: DNAL QH540.J6).

# SOIL CHEMISTRY AND PHYSICS

1334

**Ammonia volatilization from urea as influenced by soil temperature, soil water content, and nitrification and hydrolysis inhibitors.**  
SSJD4. Clay, D.E., Malzer, G.L., Anderson, J.L. Madison, Wis. : The Society. Residue cover influences temperature and water gradients in the soil profile. Changes in the physical environment of the soil influence NH<sub>3</sub> volatilization from urea-containing fertilizers. Field and laboratory experiments were conducted to investigate the influence of residue-cover-induced changes in soil water and temperature on NH<sub>3</sub> volatilization as impacted by urea treatment with a nitrification and urease inhibitor. Fertilizer treatments were urea, urea plus dicyandiamide (DCD), urea plus N-(n-butyl)thiophosphoric triamide (NBPT), and urea plus NBPT and DCD. Following fertilizer application, the soil was either left bare or covered with corn (*Zea mays L.*) residue. Every 3 h over a 4-d period, water potential, soil temperature, CO<sub>2</sub> production, and NH<sub>3</sub> volatilization were measured. The influence of fertilizer treatments on soil pH was determined in a laboratory incubation experiment conducted over 8 d under controlled environmental conditions. Treatments were similar to the field experiment, with NH<sub>3</sub> volatilization, pH, and CO<sub>2</sub> production measured daily. The NH<sub>3</sub>-volatilization rate in the field was highest 2 d after urea application at a time that corresponded with daily maximum soil temperature and decreasing soil water content. Residue cover reduced NH<sub>3</sub> volatilization. Volatilization of NH<sub>3</sub> as a result of urea application was not increased when urea was treated with DCD. Ammonia volatilization as a result of urea treatment with NBPT was reduced by 100 times over untreated urea. During an incubation experiment, soil pH increased from 6.5 to 7.2 in the urea-NBPT, and from 6.5 to 9.0 in the urea and urea-DCD treatments. Associated with the pH increase in the urea-NBPT treatment was a reduction in CO<sub>2</sub> production when compared with the untreated soil. Soil Science Society of America journal. Jan/Feb 1990. v. 54 (1). p. 263-266. Includes references. (NAL Call No.: DNAL 56.9 S03).

1335

**Availability and persistence of imazaquin, imazethapyr, and clomazone in soil.**  
WEESAG. Loux, M.M., Liebl, R.A., Slife, F.W. Champaign, Ill. : Weed Science Society of America. The availability and persistence of imazaquin, imazethapyr, and clomazone were studied in a Cisne silt loam (1.3% organic matter) and a Drummer silty clay loam (5.8% organic matter). Availability of all three herbicides to bioassay species was greater in the Cisne soil than in the Drummer soil. Corn root growth was more sensitive to imazaquin and imazethapyr than corn shoot growth. Shoot and root growth of wheat was inhibited by similar clomazone concentrations. In field experiments conducted in 1984, 1985, and 1986, all three herbicides were more persistent in the Drummer silty clay loam than in the Cisne silt loam. Clomazone and imazethapyr were detected by

liquid or gas chromatographic analysis in the Drummer soil 3 yr following application. Crop injury occurred 5 months after application of imazaquin and clomazone to the Drummer soil. In the Cisne soil, only imazethapyr caused crop injury 5 months after application. Herbicide residues found below 7.5 cm were greater in the Drummer soil than in the Cisne soil. Weed science. Mar 1989. v. 37 (2). p. 259-267. Includes references. (NAL Call No.: DNAL 79.8 W41).

1336

**Control of nutrient mixing and uptake by irrigation frequency and relative humidity.**  
AGUOAT. Kargbo, D., Skopp, J., Knudsen, D. Madison, Wis. : American Society of Agronomy. The distribution of nutrients and water between mobile and immobile pores should influence nutrient uptake. The distribution can be regulated through control of the water-filled pore space. This research was conducted to determine the effect of varying soil-water content and water uptake upon nutrient uptake. Corn (*Zea mays L.*) was grown in a growth chamber for 2 wk at 35 or 55% relative humidity (RH). Three soils Boelus LS, 5% slope (sandy over loamy, mixed, mesic Udic Haplustoll); Boelus LS, 2% slope; and Plano Soil (fine-silty, mixed, thermic Typic Haplustoll) were watered to field capacity. Plants on each soil were allowed to extract water to one of three minimal levels before rewatering. After harvest, P and K content and other root and leaf parameters were determined. The values of minimal levels were chosen so that, for each soil, the three values ensured no low-water stress. Effective diffusion coefficients were determined for the three soils. Increased minimal levels for a soil required for frequent watering, which led to greater mixing of solutes between pores. At 55% RH, no water treatment significantly affected P and K flux, despite significant differences in diffusion coefficients. At 35% RH, however, phosphate flux to roots increased as minimum levels increased. The significant increase of phosphate flux with more frequent watering at low RH suggests that plant uptake is affected by soil physical processes other than simple diffusion and convection to individual roots. More frequent watering results in greater mixing of solute between pores containing mobile and immobile water and, consequently, greater uptake. Agronomy journal. Nov/Dec 1991. v. 83 (6). p. 1023-1028. Includes references. (NAL Call No.: DNAL 4 AM34P).

1337

**Corn growth and yield as affected by surface and subsoil compaction.**  
AGUOAT. Voorhees, W.B., Johnson, J.F., Randall, G.W., Nelson, W.W. Madison, Wis. : American Society of Agronomy. Wheel traffic of harvesting operations on agricultural fields often carries compactive loads in excess of 8 Mg. Consequently, soil physical properties may be affected to depths of 60 cm, and these

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effects of compaction may persist for a number of years. In addition, smaller compactive forces that affect only the surface layer of soil are applied annually during spring tillage and planting operations. A replicated field study was conducted on a Webster clay loam (fine-loamy, mixed, mesic Typic Haplauquolls) in southern Minnesota, and two Ves clay loams (fine-loamy, mixed, mesic Udic Haplustolls) in southwestern Minnesota to assess the effects of surface and subsoil compaction on the growth and yield of corn (*Zea mays L.*). A total of six compaction treatments was imposed; subsoil compaction of control (no subsoil compaction), 9 Mg per axle, and 18 Mg per axle loads, each with and without annually applied interrow surface compaction of less than 4.5 Mg per axle. During the first year after high axle loading, 9 and 18 Mg per axle loads significantly decreased final grain yield by 9 and 30%, respectively, on the Webster soil. For the second year, the 18 Mg per axle treatment significantly reduced yield by 12% as compared with the control treatment. Soil water loss data indicated a more shallow rooting depth and/or reduced root activity in the 18 Mg per axle treatment. High axle loads on a dry Ves soil caused little subsoil compaction; grain yield was reduced by only 6% the first year after high axle loading. High axle loads on a relatively wet Ves soil compacted the soil to a depth of 60 cm. However, relatively dry climatic conditions the following year negated any potential adverse effects of subsoil compaction and yields were not affected. Surface layer compaction from annual interrow wheel traffic did not cause a significant yield response consistently at any site. *Agronomy journal*. Mar/Apr 1989. v. 81 (2). p. 294-303. Includes references. (NAL Call No.: DNAL 4 AM34P).

### 1338

**Corn yield response to water stress, heat units, and management: model development and calibration.**  
SSSJJD4. Swan, J.B. Staricka, J.A.; Shaffer, M.J.; Paulson, W.H.; Peterson, A.E. Madison, Wis. : The Society. A crop model for corn is presented that uses readily available soil, crop, meteorological, and management data as inputs to integrate the effects on grain yield of water stress, plant density, deficit of growing degree days, and planting date. The model can be run on an IBM-PC, was developed for use in the deep loessial lands of the Upper Mississippi Valley in Major Land Resource Area (MLRA) 105 and associated soil areas, and was calibrated using data for 1972 through 1984 from tillage-residue management experiments at Lancaster, WI. Estimated water stress, deficit in air-temperature growing degree days (GDD), and plant density accounted for 77% of the 79% of yield variation explained by the model. The standard error of estimate for predicted yield was 0.67 Mg ha<sup>-1</sup>. Presence in the data set of interactions between water stress and GDD, and also water stress with plant density, allowed their incorporation into the model. Tillage and residue management had the principal effects of modifying plant density, soil water storage,

and rate of phenologic development to the six-leaf stage. *Soil Science Society of America journal*. Jan/Feb 1990. v. 54 (1). p. 209-216. Includes references. (NAL Call No.: DNAL 56.9 S03).

### 1339

#### **Cornfield traffic cops.**

Reichenberger, L. Philadelphia, Pa. : The Journal. Farm journal. Feb 1989. v. 113 (3). p. 18-19. ill. (NAL Call No.: DNAL 6 F2212).

### 1340

#### **Desorption of atrazine and cyanazine from soil.**

JEVQAA. Clay, S.A. Allmaras, R.R.; Koskinen, W.C.; Wyse, D.L. Madison, Wis. : American Society of Agronomy. Removal of soluble soil organic carbon (SSOC) during herbicide desorption studies using the batch equilibration method may affect the herbicide-soil-solution equilibrium particularly if herbicide-SSOC complexes can form. Desorption characteristics of atrazine (2-chloro-4-ethylamino-6-isopropylamino-s-triazine) and cyanazine (2-4-chloro-6-(ethylamino)-s-(triazine-2-ylamino)-2-methylpropionitrile) were determined in a Ves clay loam (Aquin Hapludolls). For adsorption, the soil was equilibrated with 0.01 M CaCl<sub>2</sub> solutions containing atrazine or cyanazine. Desorption with 0.01 M CaCl<sub>2</sub> each day for 5 d resulted in hysteresis when compared to the adsorption isotherm. Replacement of the equilibration solution with soil extract for 5 d, while maintaining a higher SSOC content in the desorption equilibration solution than did the CaCl<sub>2</sub> solution, did not change desorption isotherm equations. The SSOC-herbicide complexes were not detected in any of the adsorption and desorption equilibration solutions by ultrafiltration (membranes with molecular mass cut offs of 10 000 and 500 daltons), HPLC, or TLC techniques. Either s-triazine-SSOC complexes were not formed in sufficient quantities or they were not stable enough to affect desorption of the herbicide during batch equilibration. *Journal of environmental quality*. Oct/Dec 1988. v. 17 (4). p. 719-723. Includes references. (NAL Call No.: DNAL QH540.J6).

### 1341

#### **Division S-8--fertilizer technology & use acidic zones from ammonia application in conservation tillage systems.**

SSSJJD4. Robbins, S.G. Voss, R.D. Madison, Wis. : The Society. Subsurface soil acidity resulting from repeated NH<sub>3</sub> applications in long-term conservation tillage systems that do not disturb the NH<sub>3</sub> injection zone was studied in six different crop-fertilizer-tillage systems by: (i) observation of the size, shape, and distribution of acidic zones in the field

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by using a pH color indicator method and (ii) intensive quantitative sampling of the upper 25- to 30-cm soil layer with subsequent laboratory analysis for soil pH. Acidic soil zones created by the nitrification of the injected NH<sub>3</sub> were roughly circular with 12- to 18-cm diam. Soil pH of the acidic zones was generally 0.9 to 1.8 pH units lower than that of the surrounding bulk soil. In the ridge till-plant and ridge slot-plant systems studied, a distinct highly localized persistent acidic soil zone was detected in each interrow. On the basis of the extent and degree of acidity observed, it is concluded that yield-limiting problems due to acidification by continuous NH<sub>3</sub> applications are not likely in the ridge management systems studied. In the flat no-till systems studied, numerous persistent acidic soil zones were observed scattered throughout each interrow. It is concluded that soil acidity problems due to long-term NH<sub>3</sub> usage potentially could develop in the no-till systems studied where NH<sub>3</sub> is not injected in the same vicinity each year. Efforts toward localized placement of N by the farm operator could effectively minimize potential problems due to the acidifying effects of NH<sub>3</sub> in conservation tillage systems. Soil Science Society of America journal. July/Aug 1989. v. 53 (4). p. 1256-1263. illl. Includes references. (NAL Call No.: DNAL 56.9 SD3).

1342

**Earthworm effects on corn residue breakdown and infiltration.**  
SSJD4. Zachmann, J.E. Linden, D.R. Madison, Wis. : The Society. Earthworm (*Lumbricus rubellus* Hoffmeister) activity in the field has been implicated in increased rates of residue turnover, surface soil stabilization, and increased infiltration rates due to macroporous flow. A growth-chamber study was conducted to evaluate some of the field variables associated with *L. rubellus* activity and tillage systems. Polyethylene buckets packed with sieved soil had either surface-applied, incorporated, or no corn (*Zea mays* L.) residue, each with or without worms. Treatments were subjected to diurnal temperature and light sequences, and periodic additions of water were made over 60 d to maintain near-optimum moisture conditions. Corn was grown in the cultures for an additional 30 d and was harvested before a small amount of concentrated Br solution was sprayed on the soil surface. Cultures were then subjected to simulated rainfall. Corn residue in the surface-residue treatment with worms degraded 30% faster than in the no-worm control. Plant growth and N content were not affected by the presence of worms. Burrows and casts formed under surface residue were greater in number and stability than in other worm/residue combinations. The surface-residue treatment with worms reduced runoff and caused incoming water to bypass the surface soil matrix, moving small quantities Br to significantly greater depths than in other treatments. Depth of peak Br concentration was greater in no-residue treatments than in surface-residue/worm or

incorporated-residue/worm or no-worm treatments, indicating a substantial difference in the displacement of surface-applied Br during rainfall. *L. rubellus* may alter the water balance of field soils while simultaneously hastening decomposition of the residue mat. Soil Science Society of America journal. Nov/Dec 1989. v. 53 (6). p. 1846-1849. Includes references. (NAL Call No.: DNAL 56.9 SD3).

1343

**The effects of no-till and moldboard plow tillage on the movement of nitrates and pesticides through the Vadose Zone.**

PNDAAZ. Bischoff, J. Bender, A.; Carlson, C. Grand Forks, N.D. : The Academy. Proceedings of the North Dakota Academy of Science. Apr 1990. v. 44. p. 42. Includes references. (NAL Call No.: DNAL 500 N813).

1344

**Effects of soil moisture, texture, and rate of soil drying on egg and larval survival of the southern corn rootworm (Coleoptera: Chrysomelidae).**

EVETEX. Brust, G.E. House, G.J. Lanham, Md. : Entomological Society of America. Greenhouse studies were conducted to determine the effects of four soil textures and four soil drying periods on southern corn rootworm, *Diabrotica undecimpunctata howardi* Barber, egg and larval survival and maturation. Soil drying intervals had the most detrimental effect on survival. After 4 d of soil drying (no water added to pots), only 20% of larvae survived to pupation. Low clay or organic matter and low levels of soil moisture were not conductive to survival of southern corn rootworm. The interaction of soil texture and soil drying indicates that at 4 d of soil drying, larval survival decreased (70%) in all soils, except dark-textured soils (35% decrease) compared with 2 d of soil drying. Low levels of soil moisture slowed developmental time of larvae. Eggs and first instars were the stages most negatively affected by moisture stress and different soil textures. However, in quartz-sand, the more mobile stages had low survival, probably because of cuticle abrasion from soil particles. The results of these experiments demonstrate the importance of considering the effects of rapidly drying soil on survival of southern corn rootworm and not simply the percentage of soil moisture at any one time. Environmental entomology. June 1990. v. 19 (3). p. 697-703. Includes references. (NAL Call No.: DNAL QL461.E532).

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1345

### Effects of tillage with different crop residues on runoff and soil loss.

TAAEA. McGregor, K.C. Mutchler, C.K.; Romkens, M.J.M. St. Joseph, Mich. : American Society of Agricultural Engineers. Simulated rainfall at a rate of 64 mm/h was applied to 3.4 X 10.7-m plots during 60-min initial, 30-min wet, and 30-min very wet runs. Treatments included tillage of two diskings on plots with corn residue, wheat residue, or no crop residue. Soil losses, adjusted to a 4% slope, from three replications of corn, fallow, and wheat plots averaged 4.88, 8.07, and 0.77 t/ha, respectively, during the initial 60-min runs; 2.73, 3.95, and 0.45 t/ha, respectively, during the 30-min wet runs; and 2.91, 4.63, and 0.51 t/ha, respectively, during the 30-min very wet runs. Total soil loss from the two hours of rainfall averaged 10.52, 16.65, and 1.73 t/ha for corn, fallow, and wheat, respectively. Extremely low soil losses from the wheat plots compared to corn and fallow plots occurred because two diskings were sufficient to incorporate corn residues but left substantial amounts of wheat residues on the surface. Effects of surface cover were removed by using mulch factor adjustments for average surface cover of 15, 79, and 0% for corn, wheat, and fallow plots, respectively. This resulted in very similar values for adjusted soil losses for all treatments. Results indicate that soil erosion benefits credited to incorporation of crop residues are not merited for recently incorporated residues. Transactions of the ASAE. Sept/Oct 1990. v. 33 (5). p. 1551-1556. Includes references. (NAL Call No.: DNAL 290.9 AM32T).

1346

### Efficacy of selected herbicides as influenced by soil properties.

WETEE9. Blumhorst, M.R. Weber, J.B.; Swain, L.R. Champaign, Ill. : The Society. Weed technology : a journal of the Weed Science Society of America. April/June 1990. v. 4 (2). p. 279-283. Includes references. (NAL Call No.: DNAL SB610.W39).

1347

### Influence of cover crop and wheel traffic on soil physical properties in continuous no-till corn.

SSJD4. Wagger, M.G. Denton, H.P. Madison, Wis. : The Society. Conservation tillage systems utilizing winter annual cover crops represent a different soil physical environment compared to conventional tillage systems. A field experiment was conducted for 3 yr on a Goldsboro fine sandy loam (fine-loamy, siliceous, thermic Aquic Paleudults) in the North Carolina Coastal Plain to assess effects of cover crop type and row position on soil physical properties under no-tillage corn (*Zea mays* L.) management. Bulk density, soil porosity, and hydraulic conductivity (Ksat) were measured in fallow, winter wheat (*Triticum*

*aestivum* L.), and hairy vetch (*Vicia villosa* Roth.) systems with respect to three row positions (trafficked, untrafficked, and plant row). All traffic was controlled such that each corn row was bordered by a trafficked and untrafficked interrow. In general, soil physical properties were unaffected by cover crop type but strongly influenced by position. Bulk density was significantly higher in the trafficked vs. untrafficked position (1.74 vs. 1.52 Mg m<sup>-3</sup>) after 3 yr and tended to increase with time in the trafficked interrow. Associated with higher bulk density values in the trafficked interrow were significantly lower values for soil porosity and Ksat. Total porosity in the trafficked position, averaged over cover crop type and 3 yr, decreased 21% below that of the untrafficked position. After 3 yr, Ksat was 0.019 and 0.002 mm s<sup>-1</sup> in untrafficked and trafficked interrows, respectively. These results suggest that controlled traffic patterns may be an important component in the management of continuous, conservation tillage systems. Soil Science Society of America journal. July/Aug 1989. v. 53 (4). p. 1206-1210. Includes references. (NAL Call No.: DNAL 56.9 S03).

1348

### Influence of edaphological factors on residual activity of selected insecticides in laboratory studies with emphasis on soil moisture and temperature.

JEENAI. Monke, B.J. Mayo, Z.B. Lanham, Md. : Entomological Society of America. A bioassay procedure using southern corn rootworm larvae (*Diabrotica undecimpunctata howardi* Barber) was used to study the effects of different soils and soil factors on the relative decline in biological activity of six soil insecticides. Larval mortality was used as an index of the effect of various soil factors on the persistence of carbofuran, chlorpyrifos, fonofos, isofenphos, phorate, and terbufos. The range in LC90's across all soils was least for terbufos and greatest for carbofuran. LC90's increased as the percentage of organic matter increased. Temperature had very little effect on the change in mortality. Mortality was least depressed at the high moisture level for chlorpyrifos, isofenphos, and to some extent, carbofuran. Phorate response was variable. Mortality from fonofos and terbufos was appreciably decreased at the high moisture level. Mortality in carbofuran treatments declined as soil pH increased. Chlorpyrifos and terbufos activity decreased in soils with a higher percentage of clay. Carbofuran and isofenphos consistently maintained biological activity the longest. Journal of economic entomology. Feb 1990. v. 83 (1). p. 226-233. Includes references. (NAL Call No.: DNAL 421 J822).

**Long-term conventional and no-tillage effects on selected soil physical properties.**

SSSJ04. Hill, R.L. Madison, Wis. : The Society. Soil management systems can affect soil physical properties and, thus, have a direct bearing on crop performance. This study determined the effects of continuous long-term conventional and no-tillage management on selected soil physical properties and compared observed yield differences between these tillage systems with soil physical properties. Three Maryland locations, each having randomized complete-block designs with three replications of continuous corn (*Zea mays L.*) under conventional and no-tillage management, were used. Sites 1 and 2 were in their 12th yr of tillage and Site 3 was in its 11th yr. Soils at all three sites were silt loams (fine-loamy, mixed, Aquic Hapludults). Tillage affected bulk density at the 0.05 level at Site 1 and the 0.10 level at Site 2. No-tilled soils generally had higher bulk density at all soil depths for Sites 1 and 2. Tillage affected soil strength at Sites 1 and 2, but not at Site 3. Soil strength for no-tilled soils was consistently greater than for conventionally tilled soils. Conventionally tilled soils had greater pore volume in pores with radii > 15 micrometers at Sites 1 and 2, and, therefore, should drain more readily than no-tilled soils. More importantly, the amount of pore space available for the storage of plant-available water was greater for conventionally-tilled soils at Sites 1 and 2. Although soil physical properties within the Ap horizon are not adequate to account for differences in corn yield response, tillage differences in soil physical properties were found for the soils at Sites 1 and 2, which had previously shown tillage yield differences. Soil Science Society of America journal. Jan/Feb 1990. v. 54 (1). p. 161-166. Includes references. (NAL Call No.: DNAL 56.9 S03).

**Long-term wheel traffic effects on soil physical properties under different tillage systems.**

SSSJ04. Hill, R.L. Meza-Montalvo, M. Madison, Wis. : The Society. This study determined the effects of long-term vehicular wheel traffic on soil physical properties for a Mattapex silt loam (fine-loamy, mixed, mesic Aquic Hapludult) under different tillage systems. The site utilized a randomized complete-block design with four replications of continuous-corn (*Zea mays L.*) plots under no-till and conventional till, both of which had controlled wheel traffic for 14 yr. Wheel-traffic loads during the 14-yr period had been confined to axle loads of < 4.5 Mg. Wheel traffic generally increased bulk density and soil strength. Wheel traffic resulted in over a 50% increase in soil strength when compared with non-wheel-tracked areas. The relative soil strength increase from wheel traffic was less for no-tilled soil than conventionally tilled soil, although the mean increase (approximately 40 kPa) was the same for both tillage systems. Wheel-traffic effects

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on bulk density and soil strength decreased with depth and were largely dissipated by the 30-cm depth. The presence of wheel traffic in the conventionally tilled interrows significantly reduced the pore volume of pores > 15 microm in the upper 17.8-cm portion of the soil, but did not cause similar reductions in the no-tilled interrows. Conventionally tilled soil exhibited more pore space in the 15- to 0.1-microm radius range that should retain plant-available water. Wheel traffic did not exhibit statistically significant effects for the 15- to 0.1-microm range. Neither tillage system nor wheel traffic adversely changed soil physical properties so much that detrimental conditions for plant growth would be encountered. Reasonable doubt exists regarding the necessity to subsoil this soil on a regular basis to alleviate the effects of wheel traffic or continuous no-tillage management as long as small-scale farm equipment has been used. Soil Science Society of America journal. May/June 1990. v. 54 (3). p. 865-870. Includes references. (NAL Call No.: DNAL 56.9 S03).

**Maize production impacts on groundwater quality.**

JEVQAA. Schepers, J.S. Moravek, M.G.; Alberts, E.E.; Frank, K.D. Madison, Wis. : American Society of Agronomy. The cumulative effects of management practices on nitrate-nitrogen (NO<sub>3</sub>-N) leaching and groundwater quality are frequently difficult to document because of the time required for expression and the diversity of interacting processes involved. This work reports results of a N and water management program initiated by the Central Platte Natural Resource District (CPNRD) in Nebraska. Cultural practices recommended by the CPNRD and reported by producers for the 1988 growing season, representing approximately 3900 fields covering 84 210 ha of irrigated corn (*Zea mays L.*) indicated NO<sub>3</sub>-N contamination of groundwater was influenced by yield goals and fertilizer N application rates. Groundwater NO<sub>3</sub>-N concentrations were positively correlated with residual N in the surface 0.9 m of soil prior to the growing season, reflecting the effects of past N and water management practices. Yield goals in 1988 averaged 9% higher than the average 10.0 Mg ha<sup>-1</sup> corn yield attained, which accounts for an average of about 20 kg N ha<sup>-1</sup> in excess of the average N recommendation. By comparison, in a 1980 to 1984 study from an area within the CPNRD, yield goals averaged 28% greater than actual yields. Overly optimistic yield goals in 1988 accounted for 42% of the average excess N application rate of 48 kg ha<sup>-1</sup> (based on University of Nebraska recommendations). A large portion of average excess N application is attributed to producers in 14% of the area who applied > 100 kg N ha<sup>-1</sup> more than the recommended rates. Fertilizer N applied showed little relationship to fertilizer N recommended. Better education and more stringent measures may be required to address the select group of producers who fail to follow CPNRD recommendations. Journal of environmental quality. Jan/Mar 1991. v. 20 (1). p. 12-16. Includes references. (NAL Call No.:

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DNAL QH540.J6).

1352

### Managing slowly permeable soils for tobacco and corn production in Kentucky.

Wells, K.L. Phillips, R.L. Lexington, Ky. : The Service. AGR - University of Kentucky, Cooperative Extension Service. Jan 1990. (143). 4 p. (NAL Call No.: DNAL S65.K4).

1353

### Microbial degradation of some soil-applied insecticides, herbicides, and insecticide-herbicide combinations.

BECTA6. Reed, J.P. Keaster, A.J.; Kremer, R.J.; Kerr, H.D. New York, N.Y. : Springer-Verlag. Bulletin of environmental contamination and toxicology. May 1989. v. 42 (5). p. 676-681. Includes references. (NAL Call No.: DNAL RA1270.P35A1).

1354

### Microlysimeter soil columns for evaluating pesticide movement through the root zone.

JEVQAA. Fermanich, K.J. Daniel, T.C.; Lowery, B. Madison, Wis. : American Society of Agronomy. Field approaches to studying pesticide movement are subject to numerous variables of the environment, many of which are difficult and expensive to monitor. This study describes the design, construction, operation, and performance of intact microlysimeter soil (Plainfield loamy sand-mixed, mesic, Typic Udipsamment) columns used to examine the mobility of two insecticides through soil from two tillage plots (conventional-moldboard plow and no-till tillage). Field leaching conditions were approximated by simulating a moisture and temperature regime characteristic of a natural soil profile. Measured daily and seasonal temperature fluctuated according to a pattern characteristic of a field soil.

Evapotranspiration (ET) from the soil columns was 61% of the total water applied and was nearly equal to the ET measured (63%) from field lysimeters of this soil planted to corn (*Zea mays L.*). Variation in cumulative drainage was small, total drainage from all columns was within a range of 3.9 cm. There was no significant difference in the transport of bromide (conservative tracer) through columns from the two tillage plots. Bromide leachate loss was 62 and 63% of the amount applied for conventional-moldboard plow and no-till columns, respectively. Intact soil columns established in a microlysimeter fashion provided a means to compare the movement of agricultural chemicals under controlled conditions in the greenhouse that approximate conditions/processes in the field. Journal of environmental quality. Jan/Mar 1991. v. 20 (1). p. 189-195. Includes references. (NAL Call No.: DNAL QH540.J6).

1355

### Nitrogen balance and biomass production of newly established no-till dryland agroecosystems.

AGJOAT. Wood, C.W. Peterson, G.A.; Westfall, D.G.; Cole, C.V.; Willis, W.O. Madison, Wis. : American Society of Agronomy. Soil-crop management affects the soil-N balance and, thus, has a direct bearing on soil productivity. This study determined the effects of cropping intensity (crops/time) under no-till and grassland establishment on aboveground biomass production and the system-N balance after 4 yr (1985-1989). The effects were examined across toposequences in the West Central Great Plains that had been tilled and frequently fallowed for > 50 yr. Production systems included wheat (*Triticum aestivum L.*)--fallow (WF), wheat-corn (*Zea mays L.*) or sorghum (*Sorghum vulgare L.*)--millet (*Panicum miliaceum L.*)--fallow (WCMFW), and perennial grass (CG). Intense agronomic systems (WCMF) had greater aboveground production, greater N uptake, and greater percent plant residue retention than WF. Continuous grass systems had less aboveground production and N uptake but greater percent plant residue retention than agronomic systems. Soil-profile NO<sub>3</sub>-N was lower under WCMF systems than WF systems, but organic N showed the opposite trend implying that more intense systems are at less risk for NO<sub>3</sub>-N leaching, and have greater potential for replenishment of soil-organic N via enhanced immobilization. Aboveground biomass production and plant residue production increased downslope, but slope position had little effect on plant-N uptake, plant residue retention, or soil-N dynamics. Imposing no-till and perennial grassland systems created a N-balance disequilibrium, but more time will be required to ascertain the trajectory of N loss or gain due to establishment of no-till or grassland management on these soils. Agronomy journal. May/June 1991. v. 83 (3). p. 519-526. Includes references. (NAL Call No.: DNAL 4 AM34P).

1356

### Pesticide mobility and persistence in microlysimeter soil columns from a tilled and no-tilled plot.

JEVQAA. Fermanich, K.J. Daniel, T.C. Madison, Wis. : American Society of Agronomy. Pesticide leaching losses under varying tillage systems, especially in sandy soils, is not clearly understood. This study compared the leaching and dissipation of two corn (*Zea mays L.*), 14C-labeled, insecticides--carbofuran (2,3-dihydro-2,2-dimethyl-7-benzo-furanyl-methylcarbamate) and chlorpyrifos O,O-diethyl O-(trichloro-2-pyridyl) phosphorothioate --in sandy soil columns from conventional-moldboard plow (CN) and no-till (NT) tillage plots. Microlysimeters, utilizing intact soil columns from established tillage plots, were used to investigate pesticide mobility and dissipation under simulated field precipitation, drainage, and temperature patterns. Leachate from CN tillage columns receiving 14C-carbofuran contained over two times more of the applied 14C (17.9%) compared to NT columns (7.9%). The

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major portion (63%) of <sup>14</sup>C-carbofuran residues leached from CN columns was associated with a metabolite (unknown I) compared to 40% for NT columns. Slightly more (4.9% compared to 4.6%) as parent carbofuran leached from CN columns relative to NT. After 106 d of simulated field conditions, 4.0 and 7.8% of the applied parent <sup>14</sup>C-carbofuran was recovered from the soil of CN and NT columns, respectively. Average time to peak <sup>14</sup>C-carbofuran residue concentrations were retarded by 12 and 39 d for CN and NT columns, respectively, compared to time to peak concentrations of bromide. Less than 0.2% of the applied <sup>14</sup>C-chlorpyrifos leached from the soil columns. Differences in the physical, chemical, and/or biological characteristics between CN and NT tillage columns influenced the dissipation and mobility of carbofuran. Journal of environmental quality. Jan/Mar 1991. v. 20 (1). p. 195-202. Includes references. (NAL Call No.: DNAL QH540.J6).

1357

**Phosphorus behavior in flooded-drained soils.**  
**III. Phosphorus desorption and availability.**  
SSSJD4. Sah, R.N. Mikkelsen, D.S.; Hafez, A.A. Madison, Wis. : The Society. Four California soils that showed wide variability in soil properties and P sorptivity under flooded-drained (FD) conditions were selected for this study. The soils were flooded for 0 to 90 d at two levels of organic matter (OM, 0 and 10 g kg<sup>-1</sup>) and two temperatures (23 and 35 degrees C). They were subsequently drained and used for P-sorption studies at 0.3, 1.2, and 2.0 mM initial P concentrations. The P desorption from P-sorbed soils were carried out in three consecutive extractions with 0.1 M NaCl. The effect of FD conditions-on P availability to corn (*Zea mays L.*), was studied at three levels of P (0, 5, and 20 mg P kg<sup>-1</sup> soil). Without OM treatment, FD conditions decreased P desorption in three of four soils examined. Added OM and higher temperature further decreased P desorption and the period of flooding (FP) required to reach the minimum P desorption. Organic matter markedly decreased P desorption even in Soil 3, which was unaffected by FD conditions. Under FD conditions, plant-tissue P concentration of corn was decreased to a variable extent depending on soil type. The desorption of added fertilizer P in a given FD soil correlated well with changes in the amorphous FeA fraction under comparable conditions. Phosphorus sorption and desorption were controlled by the changes in amorphous FeA and, in some cases, amorphous FeB fractions. Soil Science Society of America journal. Nov/Dec 1989. v. 53 (6). p. 1729-1732. Includes references. (NAL Call No.: DNAL 56.9 S03).

1358

### Potassium in Atlantic Coastal Plain Soils. I. Soil characterization and distribution of potassium.

SSSJD4. Parker, D.R. Sparks, D.L.; Hendricks, G.J.; Sadusky, M.C. Madison, Wis. : The Society. Corn (*Zea mays L.*) grown on sandy Atlantic Coastal Plain soils is often unresponsive to applications of K fertilizer. As a part of a field study on the response of irrigated, intensively managed corn to K applications, we characterized four representative Hapludults from the Delaware Coastal Plain and evaluated their K status. The soils were generally quite sandy with maximum clay contents of 11.4 to 26.5%, had low (greater than or equal to 2.0%) organic matter contents, and had correspondingly low cation exchange capacities (1 to 4 cmolc kg<sup>-1</sup> by summation). The clay fractions were dominated by kaolinite and hydroxy-interlayered 2:1 expandable minerals; the latter may play a crucial role in the overall chemistry of K in these soils. The soils were quite high in total K, with means for the four soils (across horizons) ranging from 23.6 to 43.9 cmolc kg<sup>-1</sup>, and this was ascribed to the K-rich parent material and relatively young age of these soils. Most (97-98%) of the total K was in mineral forms, and the majority (65-87%) was in the sand fractions, virtually all as K-feldspars. Exchangeable and nonexchangeable (fixed) K levels were relatively low and were of comparable magnitude. Consideration of particle size distribution, K distributions, and published studies of weathering rates suggested that the sand fractions of these soils represent significant sources of plant-available K. Soil Science Society of America journal. Mar/Apr 1989. v. 53 (2). p. 392-396. Includes references. (NAL Call No.: DNAL 56.9 S03).

1359

### Potassium in Atlantic Coastal Plain Soils. II. Crop responses and changes in soil potassium under intensive management.

SSSJD4. Parker, D.R. Hendricks, G.J.; Sparks, D.L. Madison, Wis. : The Society. Corn (*Zea mays L.*) grown on sandy Atlantic Coastal Plain soils is often unresponsive to applications of K fertilizer. The purpose of this investigation was to examine the response of irrigated, intensively managed corn to K applications, and to monitor changes in soil K status. Field studies were conducted for 3 years at four sites on the Delaware Coastal Plain. Treatments consisted of 0, 94, or 282 kg ha<sup>-1</sup> applied K, both as single application and in three split applications. Grain yields were high (6.9 to 14.0 Mg ha<sup>-1</sup>), but were not significantly (p less than or equal to 0.05) affected by K application for any yearsite combination. Similarly, corn ear leaves at silking contained adequate K (20 to 30 mg kg<sup>-1</sup>), although these concentrations varied with K application rate on the two sandier soils. In the zero K plots, dilute double acid-extractable K concentrations ranged from 56 to 194 mg kg<sup>-1</sup> at the start of the study, and had declined by 29 to 45% by the

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end of the growing season. Evidence was obtained for both leaching of applied K and conversion to nonexchangeable forms. The lack of observed yield response was ascribed to (i) modest crop removal of K when corn is harvested only for grain, (ii) adequate K-buffering capacity of these soils to meet high crop demands during the growing season, and/or (iii) availability of significant quantities of subsoil K. Our results further suggested that, despite the high grain yields obtained, current recommendations by several state soil testing laboratories in the region are, if anything, somewhat excessive in that K fertilizer is recommended even when no yield response is observed. Soil Science Society of America journal. Mar/Apr 1989. v. 53 (2). p. 397-401. Includes references. (NAL Call No.: DNAL 56.9 S03).

1360

**Rainfall distribution under a corn canopy: implications for managing agrochemicals.**  
AGJOAT. Parkin, T.B. Codling, E.E. Madison, Wis. : American Society of Agronomy. A greater understanding of the spatial patterns of water inputs to soil will aid the development of agricultural practices to reduce leaching and runoff of agrochemicals. This study was initiated to investigate the process of stemflow, and to provide quantitative data on the distribution of rainfall under a corn (*Zea mays L.*) canopy. Rainfall distribution under the canopies of replicate conventional till corn plots was investigated by placing rainfall collectors at discrete locations within small 1.6-m by 0.76-m areas of the plots. Collection cups were also fixed around the stalks of individual corn plants to quantify stemflow. Results obtained from eight storm events in 1987 revealed that corn plants channel 19 to 49% of the total rain inputs down the stem to the base of the stalk. This stemflow plus the rainfall impinging directly in the planting furrow, accounted for approximately 42% of the total water inputs from a given storm event. These increased water inputs to the planting furrow may have implications in modeling solute leaching and runoff as well as to modifying current fertilizer and pesticide application methods. Agronomy journal. Nov/Dec 1990. v. 82 (6). p. 1166-1169. Includes references. (NAL Call No.: DNAL 4 AM34P).

1361

**Relationship of some soil pore parameters to movement of first-instar western corn rootworm (Coleoptera: Chrysomelidae).**  
EVETEX. Gustin, R.D. Schumacher, T.E. Lanham, Md. : Entomological Society of America. The movement of first-instar western corn rootworms, *Diabrotica virgifera virgifera* LeConte, was studied in relation to soil porosity. Movement toward corn roots was restricted to less than 5 cm in soil with a bulk density of 1.1 mg/m<sup>3</sup> and 7% of the soil pores with a diameter greater than 0.30 mm. The distance moved did not increase with time.

Movement decreased significantly with distance in continuous artificial pores with a diameter of 0.15 mm. Pores approximating the larvae head-capsule size and larger did not limit larval movement out to 30 cm. Movement toward a host depends on continuity of soil pores. Environmental entomology. June 1989. v. 18 (3). p. 343-346. Includes references. (NAL Call No.: DNAL QL461.E532).

1362

**Response of irrigated corn to sulfur fertilization in the Atlantic Coastal Plain.**  
SSJD4. Kline, J.S. Sims, J.T.; Schilke-Gartley, K.L. Madison, Wis. : The Society. Accurate prediction of yield response by corn (*Zea Mays L.*) to S fertilization on the coarse-textured soils of the Atlantic Coastal Plain requires information on availability and persistence of subsoil SO<sub>4</sub>-S, potentially mineralizable soil S, and S added in irrigation and precipitation. A 3-yr study was conducted with irrigated corn on four soils possessing characteristics commonly associated with S deficiency. A factorial combination of S application rate (0, 33, 67, 101 kg ha<sup>-1</sup>) and method (single broadcast at planting, split) was used. Grain yield, and S concentrations and N/S ratios of early whole plants (EWP) and ear leaves (EL) were determined. Extractable SO<sub>4</sub>-S (0-100 cm) levels and inputs of S from irrigation and precipitation were measured in each year; mineralizable S in Ap horizons of all soils was determined by two incubation methods (leached and nonleached). Although application of S generally increased plant S concentrations, significant yield increases occurred in only three of the 12 site-year combinations. Critical values for S and N/S, based on combined data from responsive sites, were 2.1 and 1.6 g S kg<sup>-1</sup> and 18.7 and 20.3, for EWP and EL, respectively. Lack of yield response was attributed to subsoil SO<sub>4</sub>-S, (average, 0-100 cm = 170 kg S ha<sup>-1</sup>, mineralizable S (average = 80 kg ha<sup>-1</sup>, leached method) and S contained in irrigation or precipitation (annual average = 7.5 kg ha<sup>-1</sup>). Yield increases obtained at the most responsive site may have been caused by increased immobilization of S, due to no-tillage management, the presence of a physical barrier to root penetration at 40 to 60 cm, or subsoil A1. Successful prediction of corn response to S fertilization in Coastal Plain soils will require a comprehensive program that combines subsoil sampling and selective plant analysis, concentrated on sites identified as potentially responsive based on soil properties. Soil Science Society of America journal. July/Aug 1989. v. 53 (4). p. 1101-1108. Includes references. (NAL Call No.: DNAL 56.9 S03).

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1363

### Scouting corn in North Carolina.

Linker, H.M. Van Duyn, J.W.; Anderson, J.R. Jr.; Lewis, W.M. Raleigh, N.C. : The Service. AG - North Carolina Agricultural Extension Service, North Carolina State University. May 1990. (399). 11 p. (NAL Call No.: DNAL S544.3.N6N62).

1364

### Soil compaction, machinery selection, and optimum crop planning.

TAAEA. Lavoie, G. Gunjal, K.; Raghavan, G.S.V. St. Joseph, Mich. : American Society of Agricultural Engineers. Previous studies on the economics of soil compaction have selected the optimum machinery complement on the basis of cost minimization. In this study the revenue side of the machinery is also considered. Linear programming models are developed to maximize net farm income considering the yield loss implications of different tractor sizes, farm sizes, and weather conditions. The results indicate that grain corn cultivated conventionally is the best system for the three weather patterns: wet, dry, and average. The optimum tractor size is 140 kW for a wet year and 60 kW for a dry year and 100 kW an average year. The impact and implications on the optimum net farm income of two other cultural practices, reduced tillage and crop rotation, are also analyzed in this study. Transactions of the ASAE. Jan/Feb 1991. v. 34 (1). p. 2-8. Includes references. (NAL Call No.: DNAL 290.9 AM32T).

1365

### Spatial and temporal variation of ponded infiltration.

SSJD4. Starr, J.L. Madison, Wis. : The Society. Infiltration of water into soil is controlled by a complex set of soil and biotic factors, and may be an important factor affecting the fate of water and agrochemicals under different tillage systems. This study was conducted to assess the spatial and temporal variation of ponded infiltration as affected by plow- (PT) and conservation-tillage (CT) corn (*Zea mays* L.) systems under different plant and row location conditions. Ponded-infiltration rates were measured on eight dates from 3 June to 7 November. Saturated hydraulic conductivity and sorptivity, K, and S, were estimated by fitting a mechanistic infiltration model to the data. Subsequently, a third parameter, the cumulative 1-h infiltration, I<sub>1</sub>, was calculated from the model using the derived K, and S values. All three infiltration parameters were used to assess treatment and sampling-position effects on infiltration. Frequency distributions for K<sub>s</sub>, S, and I<sub>1</sub> were highly skewed with quasi-log-normal distribution. Temporal variation gave rise to a strong seasonal impact on infiltration, resulting in I<sub>1</sub> values under CT that were significantly greater than those under PT from June through August. An abrupt change in K<sub>s</sub> occurred by

early October, resulting in PT and CT then having similar infiltration characteristics. Soil Science Society of America journal. May/June 1990. v. 54 (3). p. 629-636. Includes references. (NAL Call No.: DNAL 56.9 S03).

1366

### Sulfometuron persistence and movement in soil and water in North Dakota.

JEVQAA. Lym, R.G. Swenson, O.R. Madison, Wis. : American Society of Agronomy. The lateral movement, soil persistence and aqueous hydrolysis of sulfometuron

12-( (4,6-dimethyl-2-pyrimidinyl)amino carbonyl) amino sulfonyl)-benzoic acid was evaluated. Sulfometuron applied at 140 g a.i. ha<sup>-1</sup> from slopes to nontarget areas was minimal and was not detected in the 0-to-30-cm-soil depth, when sampled up to 120 cm downslope from the treated area on 2, 8, or 16% slopes 1 yr after treatment. The highest sulfometuron concentration found downslope from the treated area was less than 1 microgram kg<sup>-1</sup> regardless of the slope. Sulfometuron moved beyond the soil column (70 cm deep) in Fairdale loam fine-loamy, mixed (calcareous), frigid, Mollis Udifluvents, Felor silty clay loam (fine-loamy, mixed, Typic Agriborolls), and Barnes stony loam (fine-loamy, mixed, Udic Haploborolls) soils when leached with 45.7 cm of water for 48 h compared to only 35 to 50 cm deep when leached with the same amount of water over 9 wk. Sulfometuron degradation increased as soil temperature and moisture increased. Sulfometuron was detected for an average of 429 d in Felor silty clay loam at pH 6.1, 8 degrees C, and 45% field capacity but only 218 d in the same soil at 90% field capacity and 16 degrees C. Degradation was slower in Renshaw and Sioux sandy loam (undifferentiated soil mixture) fine-loamy over sandy or sandy skeletal mixed Udic Haploborolls and sandy-skeletal mixed Udotheutic Haploborolls with a pH of 7.4 and averaged >700 d, regardless of environmental conditions. Sulfometuron hydrolysis was similar regardless of solution pH with an average of 63% 14C-sulfometuron remaining after 28 d in water at pH 5, 7, and 9. The average half-life of 14C-sulfometuron was 31 and 65 d in ultraviolet-irradiated and dark control samples, respectively. Journal of environmental quality. Jan/Mar 1991. v. 20 (1). p. 209-215. Includes references. (NAL Call No.: DNAL QH540.J6).

1367

### Survival time of unfed, first-instar western corn rootworm (Coleoptera: Chrysomelidae) and the effects of soil type, moisture, and compaction on their mobility in soil.

EVETEX. Macdonald, P.J. Ellis, C.R. Lanham, Md. : Entomological Society of America. If soil factors at the time of hatch significantly influence the survival time of newly eclosed rootworm larvae or their ability to move through the soil to host roots, monitoring significant factors may provide an opportunity to improve predictions of economic damage.

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Survival time of *Diabrotica virgifera virgifera* LeConte was reduced at less than 100% RH and as temperature increased. Larvae moved farthest in loam soil with 24 and 30% moisture (-0.38 and -0.13 bars). Movement was restricted in wet soil (36%, or -0.05 bar) and in soil with 18% moisture or less. Larvae moved more than three times farther through silty clay or loam than through loamy sand. Movement through loam soil at a matric potential -0.38 bar was unaffected by bulk densities of 1.2 to 1.8 g/cc, and at least 5% of larvae moved to the farthest section of the test chamber at all bulk densities within 6 h under these conditions. Larvae survived for sufficient time in the soil to reach roots under most soil conditions. When soil is very wet or dry, increased mortality or decreased movement can reduce larval establishment. Environmental entomology. June 1990. v. 19 (3). p. 666-671. Includes references. (NAL Call No.: DNAL QL461.E532).

1368

**Temporal effects of subsoil compaction on soil strength and plant growth.**  
SSJD4. Lowery, B. Schuler, R.T. Madison, Wis. : The Society. In recent years, scientists have become concerned that heavy farm equipment is causing soil compaction below the nominal depth of tillage. Compaction this deep may not be ameliorated after one season's freeze-thaw and wet-dry cycles. Experiments were conducted on a Kewaunee (fine, mixed, mesic Typic Hapludalf) and Rozetta (fine-silty, mixed, mesic Typic Hapludalf) soil to determine the duration and effect of subsoil compaction on soil strength and corn (*Zea mays L.*) growth. Soil at two sites was compacted with 8 and 12.5 Mg axle loads in the spring of 1983. Cone-penetration resistance of compacted soil was significantly higher than that of uncompacted soil below the plow zone. Plant heights, at physiological maturity averaged across both sites, were reduced 13 and 26% on the 8- and 12.5-Mg compaction treatments, respectively, compared with the control in 1983. In 1984, average mature plant heights were 2.4, 2.3, and 2.3 m for the control 8-, and 12.5-Mg compaction, respectively. Three years after the compaction was applied (1986), the average mature plant height for the 8- and 12.5-Mg compacted sites were reduced 3.1 and 4.3% compared with the control. Nitrogen and K uptake was reduced by compaction. Iron, Al, and Mn uptake increased with increasing levels of compaction on the Kewaunee soil in 1983. In 1983, yields for the 8- and 12.5-Mg treatments on the Rozetta soil were reduced 4 and 14%, respectively, relative to the control. Similarly, yields for the Kewaunee soil were reduced 14 and 43%. Yields for the Kewaunee soil were not reduced by compaction in 1984, although 5 and 9% reductions were observed at the Rozetta site. Yields were not affected the following 2 yr (1985 and 1986), whereas the resistance to cone penetration was significantly in the compacted plots compared with the control. Soil Science Society of America journal. Jan/Feb 1991. v. 55 (1). p. 216-223. Includes references. (NAL Call No.: DNAL 56.9 S03).

1369

**Temporal persistence of spatial patterns of soil water content in the tilled layer under a corn crop.**  
SSJD4. Van Wesenbeeck, I.J. Kachanoski, R.G.; Rolston, D.E. Madison, Wis. : The Society. The temporal persistence of the spatial pattern of soil water storage (0-0.2 m) under a corn (*Zea mays L.*) canopy during drying and recharge periods were examined using spatial coherency analysis and transfer function theory. The corn crop caused both drying and recharge to occur at very specific scales, equal to the crop row spacing. The calculated transfer function, or time varying spectrum showed the scale at which the change in the spatial pattern was occurring and quantified the increase or decrease in variance at that scale. The spatial pattern of the drying coefficients, a measure of the relative drying rate, also varied systematically with significantly higher drying rates in the row area developing as the growing season progressed. The increase in relative drying rate in the row area caused the spatial pattern of drying to change at a scale equal to the crop row spacing. The calculated transfer function of the drying coefficients over the growing season indicated a steady increase in variance at that same scale, while the variance at other scales did not change significantly. An equation is developed relating the transfer function of soil water content in space to the spectrum of the process causing the change in the spatial domain. Soil Science Society of America journal. July/Aug 1988. v. 52 (4). p. 934-941. Includes references. (NAL Call No.: DNAL 56.9 S03).

1370

**Temporal variations in soil structural properties under corn and soybean cropping.**  
SOSCAK. Ellsworth, T.R. Clapp, C.E.; Blake, G.R. Baltimore, Md. : Williams & Wilkins. Soil science. June 1991. v. 151 (6). p. 405-416. Includes references. (NAL Call No.: DNAL 56.8 S03).

1371

**Tillage and planting system effects on corn emergence from Norfolk loamy sand.**  
AAREEZ. Karlen, D.L. New York, N.Y. : Springer. Nonuniform emergence and slow, early season growth of corn (*Zea mays L.*) have been consistent problems for conservation tillage (CT) in southeastern Coastal Plain. Low soil temperature often causes similar problems in the Corn Belt, but previous research showed that it was not the problem. The effects of preplant tillage and various CT planting systems on seedbed water content and corn emergence were measured in one laboratory and five field studies that were conducted on Norfolk (Typic Paludult) loamy sand. Seedbed water content and seedling emergence were measured frequently after planting. Without prior disking to kill winter weeds, seedbed water content was significantly lower in three

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of five studies, and seedling emergence was slower in four studies. The laboratory experiment confirmed that emergence was slower when seedbed water content was less than 50 g/kg (5%). Applying irrigation water within 24 hours after planting increased emergence from CT treatments in one study, but decreased it in another because of surface crusting. Using in-row subsoil planting systems that prepare good seedbed conditions, and planters designed for rough seedbeds improved seedling emergence in CT treatments. Results show that factors affecting seedbed water content can explain emergence and stand establishment problems better than soil temperature for CT systems on sandy Coastal Plain soils. Applied agricultural research. Summer 1989. v. 4 (3). p. 190-195. Includes references. (NAL Call No.: DNAL S539.5.A77).

1372

**Tillage and simulated rainfall intensity effect on bromide movement in an Argiudoll.**

SSSJUD4. Bicki, T.J. Guo, L. Madison, Wis. : The Society. Movement of Br<sup>-</sup> in a Flanagan silt loam (fine, montmorillonitic, mesic Aquic Argiudoll) managed under five different tillage systems and subjected to three simulated rainfall intensities was documented. Under low (10 mm/h) and medium (25 mm/h) simulated rainfall intensities, movement of Br<sup>-</sup> in the soil profile was not significantly different between moldboard plow, chisel plow, disk plow, para-till, and no-till systems. When subjected to a high simulated rainfall intensity, significantly greater Br<sup>-</sup> movement occurred in the soil profile managed under continuous, long-term no-till. Greater movement of Br<sup>-</sup> in the no-till soil was attributed to preferential flow. Soil Science Society of America journal. May/June 1991. v. 55 (3). p. 794-799. Includes references. (NAL Call No.: DNAL 56.9 S03).

1373

**Water and nitrogen management in central Platte valley of Nebraska.**

JIDEDH. Ferguson, R.B. Eisenhauer, D.E.; Bockstadter, T.L.; Krull, D.H.; Buttermore, G. New York, N.Y. : American Society of Civil Engineers. Journal of irrigation and drainage engineering. July/Aug 1990. v. 116 (4). p. 557-565. Includes references. (NAL Call No.: DNAL 290.9 AM3PS (IR)).

1374

**2001 Agriculture: High tech hits the dirt. 1.**  
Kozlov, A. Los Angeles, Calif. : Time, Inc. . Discover. Nov 1988. v. 9 (11). p. 58-59. (NAL Call No.: DNAL Q1.D57).

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1375

**Ammonia volatilization from urea as influenced by soil temperature, soil water content, and nitrification and hydrolysis inhibitors.**  
SSSJJD4. Clay, D.E. Malzer, G.L.; Anderson, J.L. Madison, Wis. : The Society. Residue cover influences temperature and water gradients in the soil profile. Changes in the physical environment of the soil influence NH<sub>3</sub> volatilization from urea-containing fertilizers. Field and laboratory experiments were conducted to investigate the influence of residue-cover-induced changes in soil water and temperature on NH<sub>3</sub> volatilization as impacted by urea treatment with a nitrification and urease inhibitor. Fertilizer treatments were urea, urea plus dicyandiamide (DCD), urea plus N-(n-butyl)thiophosphoric triamide (NBPT), and urea plus NBPT and DCD. Following fertilizer application, the soil was either left bare or covered with corn (*Zea mays L.*) residue. Every 3 h over a 4-d period, water potential, soil temperature, CO<sub>2</sub> production, and NH<sub>3</sub> volatilization were measured. The influence of fertilizer treatments on soil pH was determined in a laboratory incubation experiment conducted over 8 d under controlled environmental conditions. Treatments were similar to the field experiment, with NH<sub>3</sub> volatilization, pH, and CO<sub>2</sub> production measured daily. The NH<sub>3</sub>-volatilization rate in the field was highest 2 d after urea application at a time that corresponded with daily maximum soil temperature and decreasing soil water content. Residue cover reduced NH<sub>3</sub> volatilization. Volatilization of NH<sub>3</sub> as a result of urea application was not increased when urea was treated with DCD. Ammonia volatilization as a result of urea treatment with NBPT was reduced by 100 times over untreated urea. During an incubation experiment, soil pH increased from 6.5 to 7.2 in the urea-NBPT, and from 6.5 to 9.0 in the urea and urea-DCD treatments. Associated with the pH increase in the urea-NBPT treatment was a reduction in CO<sub>2</sub> production when compared with the untreated soil. Soil Science Society of America journal. Jan/Feb 1990. v. 54 (1). p. 263-266. Includes references. (NAL Call No.: DNAL 56.9 S03).

1376

**Corn hybrid-starter fertilizer interaction for yield and lodging.**  
CRPSAY. Teare, I.D. Wright, D.L. Madison, Wis. : Crop Science Society of America. The value of placing small amounts of soluble fertilizers in close proximity to the seed at corn (*Zea mays L.*) planting was debated in the early 1980s for corn grown in a high-yield environment, but is becoming an accepted practice in the southeastern USA. The objective of this study was to evaluate yield and lodging of several corn hybrids to starter fertilizer application in a high-yield environment. Starter and no-starter were the two fertility treatments. Starter was applied as NH<sub>4</sub>-polyphosphate (10-15-0) in a band on the soil surface at planting. Rainfall was measured, and irrigations scheduled with tensiometers. Starter fertilizer significantly increased

grain yields compared to no-starter. Hybrid X year and hybrid X starter treatment interactions were significant. Certain corn hybrids were identified as positive changers (Funks G4733, Asgrow RX777, Sunbelt 1880, Pioneer 3320, Jacques JX247, Jacques 8400, Northrup King PX9581, and Coker 8680) that consistently yielded more with starter than others identified either as nonchangers or as negative-changers. Percent lodging generally was greater with no starter fertilizer (year X starter and hybrid X starter interactions were non-significant). Hybrid X year interactions for percent lodging were significant. Certain corn hybrids (Jacques JX247, DeKalb DK748, and Jacques 8400) consistently exhibited less lodging than the hybrid mean when fertilized with a starter. The management implication is that certain corn hybrids may be profitably fertilized with a starter fertilizer but others may not, since they either do not respond (nonchangers) or respond negatively to starter fertilizer. Crop science. Nov/Dec 1990. v. 30 (6). p. 1298-1303. Includes references. (NAL Call No.: DNAL 64.8 C883).

1377

**Corn uptake and soil accumulation of nitrogen: management and hybrid effects.**  
SSSJJD4. Ferguson, R.B. Schepers, J.S.; Hergert, G.W.; Lohry, R.D. Madison, Wis. : The Society. Inefficient use of fertilizer N by corn (*Zea mays L.*) can result in the accumulation of excessive amounts of NO<sub>3</sub>(-) subject to leaching losses in the crop root zone. The fate of fertilizer N as influenced by N rate, nitrapyrin

2-chloro-6(trichloromethyl)pyridine, and corn hybrid was evaluated in a 3-yr study with sprinkler-irrigated corn. Variables were fertilizer-N rate (75, 150, and 300 kg N/ha); nitrapyrin (0 and 0.5 kg/ha), and corn hybrid (Pioneer hybrids 3377, 3475, and 3551). Nitrogen was applied as late-sidedressed (V6-V9) NH<sub>3</sub>. The fate of fertilizer N was evaluated by measurement of apparent fertilizer-N uptake (AFU), form of N in the fertilizer band prior to and following anthesis, and accumulation and distribution of N in the soil profile. There were no significant effects of hybrid on AFU across years, and no significant hybrid X nitrapyrin interactions on AFU. Nitrapyrin significantly reduced AFU across N rates and hybrids in 2 of 3 yr. Nitrate-N concentrations in the fertilizer band, in the presence of nitrapyrin, were reduced prior to anthesis in 1986. Higher NH<sub>4</sub>(+)-N concentrations in the fertilizer band in 1986, as well as trends towards higher total inorganic-N concentrations all 3 yr following anthesis, suggest mineralization of temporarily immobilized fertilizer NH<sub>4</sub>(+). Reduced AFU in the presence of nitrapyrin in 1986 and 1987 indicates reduced availability of fertilizer N consistent with a temporary immobilization process. Nitrate accumulation in the soil to a depth of 1.8 m after three growing seasons indicates a trend toward less NO<sub>3</sub>(-) accumulation where nitrapyrin was applied at N rates of 75 and 150 kg/ha. Nitrate concentrations in the soil at a depth of 1.8 m

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were significantly greater at the 150 and 300 kg N/ha rates, compared with the 75 kg N/ha rate or unfertilized soil, indicating probable movement of fertilizer N below the 1.8-m depth at the higher rates. These results indicate that nitrpyrin should not be applied with NH<sub>3</sub> at 1a. Soil Science Society of America journal. May/June 1991. v. 55 (3). p. 875-880. Includes references. (NAL Call No.: DNAL 56.9 S03).

1378

### Corn yield and residual soil nitrate as affected by time and rate of nitrogen application.

AGJOAT. Jokela, W.E. Randall, G.W. Madison, Wis. : American Society of Agronomy. Efficient use of N fertilizer for corn (*Zea mays L.*) production is important for increasing economic return to the grower and for minimizing the potential impact on water quality. Time and rate of application are important management tools for improving N efficiency. This experiment was conducted for 3 yr on two nonirrigated southern Minnesota soils--a Mt. Carroll silt loam (fine-silty, mixed, mesic Mollie Hapludalf) and a Webster clay loam (fine-loamy, mixed, mesic Typic Haplaqueoll)--to evaluate the effect of time and rate of N application on corn yield, N uptake and residual soil NO<sub>3</sub>(-1)-N. Nitrogen as (NH<sub>4</sub>)<sub>2</sub>SO<sub>4</sub> was applied in a factorial arrangement of N rate (low and high) and time of application (at planting (PL), eight-leaf stage (8L), or split evenly between the two times (SP)). A zero N control and a very high N rate at PL were also included. Nitrogen rates were 75, 150, and 225 kg ha<sup>-1</sup> on the Mt. Carroll, and 100, 200, and 300 kg ha<sup>-1</sup> on the Webster. Grain and total dry matter (DM) yield, and plant uptake of N were increased by N application in five of six site years, in most cases up to the high N rate. Delayed N application (8L or SP vs. PL) resulted in either no effect or a slight decrease in DM and in variable effects on N uptake, depending on the year and location. Residual NO<sub>3</sub>(-1)-N in the 1.5 m profile ranged from 150 to 400 kg ha<sup>-1</sup> for most treatments in the fall but was 50 to 70% lower the following spring. Residual NO<sub>3</sub>(-1) in the fall was consistently increased by delayed application of the high N rate from the PL to 8L stage, with most of the increase occurring in the upper 0.6 m of the profile. The decrease in residual NO<sub>3</sub>(-1) from fall to spring, attributed in part to leaching beyond the sampled zone, minimized the potential carryover effect for the next year's production and indicated a potential for greater environmental impact where N application was delayed. Dry matter production, N uptake, and residual NO<sub>3</sub>(-1)-N were affected by unusually. Agronomy journal. Sept/Oct 1989. v. 81 (5). p. 720-726. Includes references. (NAL Call No.: DNAL 4 AM34P).

1379

**Cover crop management and nitrogen rate in relation to growth and yield of no-till corn.** AGJOAT. Waggoner, M.G. Madison, Wis. : American Society of Agronomy. Cover crop management in no-tillage systems prior to planting the principal crop can be an important tool in maximizing the beneficial effects of the cover crop on the principal crop. A field experiment was conducted in 1984 and 1985 to examine timing effects of cover crop desiccation relative to corn planting: early desiccation/early plant (EE), early desiccation/late plant (EL), and late desiccation/late plant (LL) and fertilizer N (0, 100, and 200 kg ha<sup>-1</sup>) on corn growth and yield. These management schemes were evaluated for fallow, rye (*Secale cereale L.*), crimson clover (*Trifolium incarnatum L.*), and hairy vetch (*Vicia villosa Roth.*) cover crop systems. Corn dry matter production and N uptake, monitored in all 0 kg N ha<sup>-1</sup> treatments, were significantly affected by cover crop management and varied according to stage of development and climatic conditions. Cover crop type had a pronounced effect on corn growth, with corn dry matter production in a rye cover crop lower than in legume cover crops. Grain yield response to applied N was greatest in a rye cover crop system. In contrast, a grain yield response up to the first increment of fertilizer N (100 kg ha<sup>-1</sup>) in legume cover crop systems was observed only in 1984. Corn recovery of legume N was estimated at 40 to 45 kg N ha<sup>-1</sup> (2-yr avg.), representing approximately 36 and 30% of the total N content of crimson clover and hairy vetch, respectively. These data indicate that winter annual legume cover crops are capable of providing a substantial portion of the N required by corn. Additionally, cover crop management should insure that corn planting is not delayed to allow for additional legume growth and N production. Agronomy journal. May/June 1989. v. 81 (3). p. 533-538. Includes references. (NAL Call No.: DNAL 4 AM34P).

1380

### Crop rotation and tillage effects on soil organic carbon and nitrogen.

SSJD4. Havlin, J.L. Kissel, D.E.; Maddux, L.D.; Claassen, M.M.; Long, J.H. Madison, Wis. : The Society. Sustaining or increasing soil productivity depends in part on soil and crop management practices that maintain or increase soil organic matter. This study was conducted to determine the effects of tillage, crop rotation, and fertilizer N on soil organic C and N. Two long-term tillage/rotation studies and one long-term rotation/N-rate study were conducted on eastern Kansas soils. Soils were sampled from conventional (CT) and no-tillage (NT) treatments applied to continuous sorghum *Sorghum bicolor* (L.) Moench (S/S), continuous soybean *Glycine max* (L.) Merr. (B/B), and sorghum-soybean (S/B) rotations in the tillage/rotation studies and from the 0 and 252 kg N ha<sup>-1</sup> treatments on continuous corn (*Zea mays L.*) (C/C), B/B, and corn-soybean (C/B) rotations in the rotation/N-rate study. Organic

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C and N were determined on soils sampled at depths of 0 to 2.5, 2.5 to 7.5, 7.5 to 15, and 15 to 30 cm. Compared with CT, NT had greater organic C and N contents. Compared with B/B, S/B and S/S increased organic C and N under NT and, to a lesser extent, under CT (at 0-2.5-cm depth). Increases in organic C and N with NT compared with CT and with sorghum rotations compared with B/B were directly related to the quantity of residue produced and left on the soil surface (S/S > S/B / > B/B). Fertilizer N increased soil organic C and N only slightly. Crop management systems that include rotations with high residue-producing crops and maintenance of surface residue cover with reduced tillage result in greater soil organic C and N, which may improve soil productivity. Soil Science Society of America journal. Mar/Apr 1990. v. 54 (2). p. 448-452. Includes references. (NAL Call No.: DNAL 56.9 S03).

1381

### Development of an integrated P management recommendation system based on mechanistically interpreted soil tests: phase one--model verification.

SDABA. Woodard, H.J. Schumacher, T.E.; Carlson, C.G.; Claypool, D.; Sorenson, D. Brookings, S.D. : The Station. TB - Agricultural Experiment Station, South Dakota State University. 1991. (97). 8 p. (soil PR 90-7). (NAL Call No.: DNAL 100 S082 (3)).

1382

### Division S-8--fertilizer technology & use acidic zones from ammonia application in conservation tillage systems.

SSJD4. Robbins, S.G. Voss, R.D. Madison, Wis. : The Society. Subsurface soil acidity resulting from repeated NH<sub>3</sub> applications in long-term conservation tillage systems that do not disturb the NH<sub>3</sub> injection zone was studied in six different crop-fertilizer-tillage systems by: (i) observation of the size, shape, and distribution of acidic zones in the field by using a pH color indicator method and (ii) intensive quantitative sampling of the upper 25- to 30-cm soil layer with subsequent laboratory analysis for soil pH. Acidic soil zones created by the nitrification of the injected NH<sub>3</sub> were roughly circular with 12- to 18-cm diam. Soil pH of the acidic zones was generally 0.9 to 1.8 pH units lower than that of the surrounding bulk soil. In the ridge till-plant and ridge slot-plant systems studied, a distinct highly localized persistent acidic soil zone was detected in each interrow. On the basis of the extent and degree of acidity observed, it is concluded that yield-limiting problems due to acidification by continuous NH<sub>3</sub> applications are not likely in the ridge management systems studied. In the flat no-till systems studied, numerous persistent acidic soil zones were observed scattered throughout each interrow. It is concluded that soil acidity problems due to long-term NH<sub>3</sub> usage potentially could develop in the no-till systems studied where NH<sub>3</sub> is not

injected in the same vicinity each year. Efforts toward localized placement of N by the farm operator could effectively minimize potential problems due to the acidifying effects of NH<sub>3</sub> in conservation tillage systems. Soil Science Society of America journal. July/Aug 1989. v. 53 (4). p. 1256-1263. ill. Includes references. (NAL Call No.: DNAL 56.9 S03).

1383

### Effect of fertilization method and tillage on nitrogen-15 recovery by corn.

AGJOAT. Timmons, D.R. Cruse, R.M. Madison, Wis. : American Society of Agronomy. Fertilizer N utilization by corn (*Zea mays L.*) is influenced by different fertilizer management and tillage systems. A study was conducted in central Iowa during two consecutive years to evaluate the uptake and recovery of labeled N for continuous corn grown in two tillage systems with two fertilization methods. Tillage systems were fall moldboard-plow and ridge-till. Labeled N (5% 15N) as 28% urea-ammonium nitrate solution (UAN) was either surface-applied in the fall before any primary tillage or banded (knifed-in) between rows at 224 kg N ha<sup>-1</sup> just before planting. Depending on tillage and fertilization method, corn grain yields ranged from 1.3 to 7.3 Mg ha<sup>-1</sup> which were below normal due to adverse weather conditions during the two growing seasons. The percent of plant N derived from labeled N (Nf) in the sixth leaf (50% silk) and in mature grain, stover, and whole plants was significantly lower for fall surface-applied 15N than for spring banded 15N. For mature whole plants, Nf ranged from 9 to 59% and averaged 53% for spring banded and 17% for fall surface applied 15N. Labeled N recovery by mature corn grain was affected by fertilization method and growing season and ranged from 1 to 25% during the 2-yr period. Labeled N recovery by mature whole plants ranged from 2 to 41% and averaged four times greater for spring banded than for fall surface-applied 15N. About 1 yr after application, an average of 20% of the 15N remained in the soil profile; and 95% of the residual 15N was found in the organic N pool. Compared with spring banded N, fall surface-applied N was extremely inefficient for both tillage systems. Agronomy journal. July/Aug 1990. v. 82 (4). p. 777-784. Includes references. (NAL Call No.: DNAL 4 AM34P).

1384

### Effect of long-term tillage systems and nitrogen addition on potassium quantity-intensity relationships.

SSJD4. Evangelou, V.P. Blevins, R.L. Madison, Wis. : The Society. The no-tillage (NT) management of soils is expected to have an influence on the K<sup>+</sup> adsorption characteristics of these soils due to organic matter accumulation. The purpose of this study is to investigate this influence as affected by nitrogen (N) additions. The effect of 16 yr continuous corn (*Zea mays L.*) production under

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conventional tillage and no-tillage management on potassium quantity-intensity (Q/I) relationships was investigated on soil samples taken at 0-50 mm and 50-150-mm depths of a Maury silt loam (fine-silty, mixed, mesic Typic Paleudalfs) from central Kentucky. The results show that the Q/I plot components, labile K+, activity ratio for K+ at equilibrium (AR<sub>Ko</sub>) and linear potential buffering capacity for K+ (PB<sub>Ck</sub>) were affected by tillage and N additions. The no-tillage soil with and without N fertilizer had the highest quantity of labile K+ at the 0-50 and 50-100-mm depth. The AR<sub>Ko</sub> was also the highest for the no-tillage with and without N in comparison to conventional tillage for the two depths. The highest PB<sub>Ck</sub> value was that of conventional tillage no N at the 0-50-mm depth. The lowest PB<sub>Ck</sub> value was that of no-tillage no N also at the 0-50-mm depth. The BaC<sub>12</sub> CEC determination along with the relative affinity for K+ (determined from the slope of plots of ExK/CEC vs. AR<sub>K</sub>; where ExK = BaC<sub>12</sub> extractable K+) were the best predictors of the relationship PB<sub>Ck</sub> = CEC Kg. The relative affinity for K at the linear portion of the Q/I plots appears to be influenced by organic matter content and pH. Finally, The increase in organic matter content is shown to have a positive influence on the magnitude of highly affinity K+ sites. Soil Science Society of America journal. July/Aug 1988. v. 52 (4). p. 1047-1054. illl. Includes references. (NAL Call No.: DNAL 56.9 S03).

1385

**Effects of excessive magnesium in irrigation waters on wheat and corn growth.**  
CSOSA2. Franklin, W.T. Olsen, J.S.; Soltanpour, P.N. New York, N.Y. : Marcel Dekker. Communications in soil science and plant analysis. 1991. v. 22 (1/2). p. 49-61. Includes references. (NAL Call No.: DNAL S590.C63).

1386

**Effects of rates of nitrogen fertilization on corn yields, nitrogen losses from soils, and energy consumption.**  
Blackmer, A.M. Binford, G.D.; Morris, T. Ames, Iowa : The Service. PM - Iowa State University, Cooperative Extension Service. In the series analytic: Integrated Farm Management Demonstration Program. 1990 Progress Report. Jan 1991. (1417). p. 27-33. (NAL Call No.: DNAL 275.29 I09PA).

1387

**Good soil eases drought worries.**  
Kendall, D. Emmaus, Pa. : Regenerative Agriculture Association. The New farm. Nov/Dec 1988. v. 10 (7). p. 44-47. illl. (NAL Call No.: DNAL S1.N32).

1388

**Implications of chemical use reduction for Texas agriculture.**

Knutson, R.D. Smith, E.G.; Penson, J.B.; Taylor, C.R. College Station, Tex. : Agricultural & Food Policy Center. AFPC policy working paper. June 1990. (90-4). 18 p. (NAL Call No.: DNAL HD1751.A36).

1389

**Influence of nitrogen fertilization, tillage and residue management on a soil nitrogen mineralization index.**

CSOSA2. Clay, D.E. Clapp, C.E.; Molina, J.A.E.; Dowdy, R.H. New York, N.Y. : Marcel Dekker. Communications in soil science and plant analysis. 1990. v. 21 (3/4). p. 323-335. Includes references. (NAL Call No.: DNAL S590.C63).

1390

**Interaction of corn cultivars with nitrogen rates.**

Russell, W.A. Ames, Iowa : The Service. PM - Iowa State University, Cooperative Extension Service. In the series analytic: Integrated Farm Management Demonstration Program. 1990 Progress Report. Jan 1991. (1417). p. 73-81. (NAL Call No.: DNAL 275.29 I09PA).

1391

**Irrigation and nitrogen management effects on corn reproduction.**

AAEPC. Jennings, G.D. Martin, D.L.; Schepers, J.S. St. Joseph, Mich. : The Society. Paper - American Society of Agricultural Engineers. Paper presented at the 1989 International Meeting, December 12-15, 1989, New Orleans, Louisiana. Winter 1989. (89-2692). 29 p. Includes references. (NAL Call No.: DNAL 290.9 AM32P).

1392

**Lysimeter study of nitrogen fertilizer and irrigation rates on quality of recharge water and corn yield.**

JEVQAA. Prunty, L. Montgomery, B.R. Madison, Wis. : American Society of Agronomy. Accrual of NO<sub>3</sub>-N to groundwater as a result of agricultural practices is a focus of environmental concern. This inquiry was conducted to quantify precisely in a replicated experiment the rate of N loading to groundwater resulting from inputs of N and irrigation water to corn (*Zea mays* L.). Input levels were designed to balance potential for high production with minimum loading of NO<sub>3</sub>-N to groundwater. Four large (2.4 by 2.4 m and 2.3 m deep) drainage lysimeters with reconstructed Hecla loamy fine sand (Aquic Haplaborolls) were employed in this southeast North Dakota study.

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Grain yields at N fertilizer rates of 95 and 145 kg/ha were 10.3 and 11.3 Mg/ha, respectively. Differences in yield due to irrigation and irrigation by N interaction were nonsignificant. There was no residual effect of N fertilizers on yield. The higher irrigation rate caused increases in drainage of water within about 30 d. The higher rate of N fertilizer, however, was not reflected by increased concentration of NO<sub>3</sub>-N in the drainage water until 325 d after application. The increased concentrations then persisted to 500 d. Flow-weighted means of N concentrations for this period were 8.6 and 12.3 mg/L for the low and high N rates, respectively. For this soil and climate, irrigation and N management can be tailored to produce NO<sub>3</sub>-N concentrations below 10 mg/L with continuous corn. However, the 5:1 economic return produced by 50 kg/ha of incremental N fertilizer means that producers are unlikely to adopt the needed practices without incentives. Journal of environmental quality. Apr/June 1991. v. 20 (2). p. 373-380. Includes references. (NAL Call No.: DNAL QH540.J6).

1393

### Maize production impacts on groundwater quality.

JEVQAA. Schepers, J.S. Moravek, M.G.; Alberts, E.E.; Frank, K.D. Madison, Wis. : American Society of Agronomy. The cumulative effects of management practices on nitrate-nitrogen (NO<sub>3</sub>-N) leaching and groundwater quality are frequently difficult to document because of the time required for expression and the diversity of interacting processes involved. This work reports results of a N and water management program initiated by the Central Platte Natural Resource District (CPNRD) in Nebraska. Cultural practices recommended by the CPNRD and reported by producers for the 1988 growing season, representing approximately 3900 fields covering 84 210 ha of irrigated corn (*Zea mays* L.) indicated NO<sub>3</sub>-N contamination of groundwater was influenced by yield goals and fertilizer N application rates. Groundwater NO<sub>3</sub>-N concentrations were positively correlated with residual N in the surface 0.9 m of soil prior to the growing season, reflecting the effects of past N and water management practices. Yield goals in 1988 averaged 9% higher than the average 10.0 Mg ha<sup>-1</sup> corn yield attained, which accounts for an average of about 20 kg N ha<sup>-1</sup> in excess of the average N recommendation. By comparison, in a 1980 to 1984 study from an area within the CPNRD, yield goals averaged 28% greater than actual yields. Overly optimistic yield goals in 1988 accounted for 42% of the average excess N application rate of 48 kg ha<sup>-1</sup> (based on University of Nebraska recommendations). A large portion of average excess N application is attributed to producers in 14% of the area who applied > 100 kg N ha<sup>-1</sup> more than the recommended rates. Fertilizer N applied showed little relationship to fertilizer N recommended. Better education and more stringent measures may be required to address the select group of producers who fail to follow CPNRD recommendations. Journal of environmental quality. Jan/Mar 1991. v. 20 (1).

p. 12-16. Includes references. (NAL Call No.: DNAL QH540.J6).

1394

### New soil test cuts N rates 62%: could save money and protect groundwater throughout Corn Belt.

Cramer, C. Emmaus, Pa. : Regenerative Agriculture Association. The New farm. Mar/Apr 1990. v. 12 (3). p. 9-10. (NAL Call No.: ONAL S1.N32).

1395

### Nitrogen fertilizer recovery by corn in monoculture and rotation systems.

AGUOAT. Varvel, G.E. Peterson, T.A. Madison, Wis. : American Society of Agronomy. Crop rotations including legumes have increased in importance because of their potential to reduce large inorganic N fertilizer needs for corn (*Zea mays* L.) and other crops. This study was conducted to determine N fertilizer recovery by corn in monoculture and rotational systems. Corn was grown under rainfed conditions on a Sharpsburg silty clay loam (fine, montmorillonitic, mesic, Typic Argiudoll) in four cropping systems: (i) continuous corn monoculture, ii) a 2-yr soybean *Glycine max* (L.) -corn rotation, (iii) a 4-yr rotation of oat *Avena sativa* L. + clover 80% *Melilotus officinalis* (L.) and 20% *Trifolium pratense* -grain sorghum *Sorghum bicolor* (L.) -soybean-corn, and (iv) a 4-yr rotation of soybean-grain sorghum-oat + clover-corn at Mead, NE. Broadcast applications of 15N-depleted NH<sub>4</sub>NO<sub>3</sub> were made at 90 and 180 kg N ha<sup>-1</sup> in 1985 and 1986 to evaluate N fertilizer recovery by corn in each cropping system using isotopic methods. Nitrogen recovery determined by isotopic methods was significantly higher for corn in rotation vs. corn in monoculture, averaging 58.6 vs. 52.3% and 49.8 vs. 43.4% at the 90 and 180 kg N ha<sup>-1</sup> rates, respectively. In contrast, fertilizer N recovery estimated by the difference method was much greater in continuous corn vs. N recovery in corn following oat + clover in the 4-yr rotation. These differences indicated that N fertilizer applied to corn in each cropping system appeared to be entering different sizes and types of organic soil N pools, resulting in apparent differences in N immobilization. Our results demonstrate problems exist in estimating fertilizer N recovery with both methods (isotope or difference) and before accurate N recovery estimates by corn or any other crop can be made in complex soil and crop management systems, procedures must be developed to explicitly follow N fertilizer pathways (immobilization, denitrification, volatilization, leaching, etc.). Until that time, correct interpretations with either method. Agronomy journal. Sept/Oct 1990. v. 82 (5). p. 935-938. Includes references. (NAL Call No.: ONAL 4 AM34P).

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1396

### Nitrogen management and nitrification inhibitor effects on nitrogen-15 urea. I. Yield and fertilizer use efficiency.

SSJD4. Walters, D.T. Malzer, G.L. Madison, Wis. : The Society. Nitrification inhibitors (NI) are sometimes recommended for use with ammoniacal fertilizers in corn (*Zea mays L.*) production to improve fertilizer N use efficiency (FUE). The objectives of this experiment were to evaluate the effects of the NI nitrapyrin 2-chloro-6-(trichloromethyl) pyridine application on yield and FUE of irrigated corn, and to monitor the fate of a single application of 15N-enriched urea during a multiyear period in both soil and plant. Treatments included a factorial combination of two N rates (90 or 180 kg urea-N ha<sup>-1</sup> yr<sup>-1</sup>) applied during a 3-yr period, with or without a NI and with or without incorporation, plus a zero-N control. Twenty-seven nonweighing lysimeters were used to quantify leaching load. Treatment effects on yield and FUE differed each year due to interactions of climate and N-management variables. Nonincorporated urea + NI reduced grain yield when leaching load was low and increased yield at the 90 kg ha<sup>-1</sup> N rate when leaching load was high. Maximum FUE occurred at the 90 kg ha<sup>-1</sup> N rate when leaching load was low. The NI increased FUE only at the 90 kg ha<sup>-1</sup> N rate when leaching load was high. Incorporation of urea + NI reduced plant recovery of fertilizer-derived N (FDN) in the year of application, but resulted in increased uptake of residual FDN in subsequent years. Incorporation of NI with moderate N rates coupled with conservative irrigation management should reduce the risk of yield loss and minimize NO<sub>3</sub> movement to groundwater. Soil Science Society of America journal. Jan/Feb 1990. v. 54 (1). p. 115-122. Includes references. (NAL Call No.: DNAL 56.9 S03).

1397

### Nitrogen management and nitrification inhibitor effects on nitrogen-15 urea. II. Nitrogen leaching and balance.

SSJD4. Walters, D.T. Malzer, G.L. Madison, Wis. : The Society. Nitrification inhibitors (NI) may reduce N leaching losses, and should have the greatest effect on sandy soils where leaching potential is high. This study used 27 lysimeters to evaluate the effect of a NI, nitrapyrin 2-chloro-6-(trichloromethyl) pyridine, on soil water percolation (SWP) and N leaching losses from an irrigated sandy loam soil (Typic Hapludoll) planted with corn (*Zea mays L.*), and monitor the fate of a single application of 15N-enriched urea over a multiyear period. Urea was applied at 90 and 180 kg N ha<sup>-1</sup> yr<sup>-1</sup> for a 3-yr period, with and without NI, and with and without incorporation. Urea + NI reduced SWP between planting and silking in 2 out of 3 yr when growing degree days (GDD) were high. After silking, SWP was reduced when urea + NI was incorporated and leaching load was high. A twofold increase in N rate resulted in an average of 3.4 times more N leached over 3 yr. The NI influenced time of N loss but not total N loss. Leaching losses of

fertilizer-derived N (FDN) were delayed 25 to 50 d when urea + NI were incorporated. The leaching load required to reach the maximum rate of FDN loss was higher with urea + NI. Leaching losses of fertilizer N were three times greater when determined by the difference method than by isotope-ratio analysis. Differing results with these two calculations are attributed to isotope dilution with indigenous soil N as a result of microbial activity. Nitrification inhibitors may reduce the potential for nonpoint-source pollution by delaying NO<sub>3</sub> leaching, but will be most effective if coupled with proper N rates and conservative irrigation water management. Soil Science Society of America journal. Jan/Feb 1990. v. 54 (1). p. 122-130. Includes references. (NAL Call No.: DNAL 56.9 S03).

1398

### Nitrogen management related to groundwater quality in Minnesota.

UMNAA. Anderson, J.L. Malzer, G.L.; Randall, G.W.; Rehm, G.W. St. Paul, Minn. : The Academy. Journal of the Minnesota Academy of Science. Fall 1989. v. 55 (1). p. 53-57. maps. Includes references. (NAL Call No.: DNAL 500 M663).

1399

### Nitrogen source, rate, and application method for no-tillage corn.

SSJD4. Howard, D.D. Tyler, D.D. Madison, Wis. : The Society. Surface applying urea-containing N fertilizers may result in greater N losses by volatilization of NH<sub>3</sub> as urea hydrolyses than nonurea containing materials. The objective of this study was to evaluate the N efficiency of urea-ammonium nitrate (UAN), urea and urea-urea phosphate (UUP) at 56, 112, 168, and 224 kg ha<sup>-1</sup> N rates applied broadcast, surface banded, and injected for no-till corn (*Zea mays L.*). Yield, ear-leaf N concentration, and N uptake were used to estimate N availability. Broadcast ammonium nitrate (AN) and injected anhydrous ammonia (AA) were used as controls for evaluating N efficiency of urea-containing N sources and their application methods. The method of applying the urea-containing N sources has a significant effect on apparent N fertilizer availability. injecting UAN and urea resulted in significantly higher yield, leaf N concentration, and N uptake when compared with broadcast and surface band application methods. Surface banding UAN at 168 and 224 kg ha<sup>-1</sup> resulted in higher yields than urea or UUP. Yield, leaf N concentration and N uptake differences among the three urea-containing N sources were not observed when broadcast applied. Broadcasting AN at 168 and 224 kg ha<sup>-1</sup> resulted in higher yields than UAN, urea or UUP. Injecting the N sources resulted in higher yields when compared with broadcasting AN. Soil Science Society of America journal. Sept/Oct 1989. v. 53 (5). p. 1573-1577. Includes references. (NAL Call No.: DNAL 56.9 S03).

## (SOIL FERTILITY - FERTILIZERS)

1400

**On-farm composting of lake weeds.**  
BCYCDK. Spencer, B. Emmaus, Pa. : J.G. Press.  
BioCycle. May/June 1988. v. 29 (5). p. 54-55.  
ill. (NAL Call No.: DNAL 57.8 C734).

1401

**Optimum time(s) of nitrogen application to improve nitrogen use efficiency and reduce leaching.**

Amos, F.B. Jr. Baker, J.L.; Timmons, D.R.; Kanwar, R.S. Ames, Iowa : The Service. PM - Iowa State University, Cooperative Extension Service. In the series analytic: Integrated Farm Management Demonstration Program. 1990 Progress Report. Jan 1991. (1417). p. 35-39. (NAL Call No.: DNAL 275.29 I09PA).

1402

**Potassium in Atlantic Coastal Plain Soils. II. Crop responses and changes in soil potassium under intensive management.**  
SSJD4. Parker, D.R. Hendricks, G.J.; Sparks, D.L. Madison, Wis. : The Society. Corn (*Zea mays L.*) grown on sandy Atlantic Coastal Plain soils is often unresponsive to applications of K fertilizer. The purpose of this investigation was to examine the response of irrigated, intensively managed corn to K applications, and to monitor changes in soil K status. Field studies were conducted for 3 years at four sites on the Delaware Coastal Plain. Treatments consisted of 0, 94, or 282 kg ha<sup>-1</sup> applied K, both as single application and in three split applications. Grain yields were high (6.9 to 14.0 Mg ha<sup>-1</sup>), but were not significantly (p less than or equal to 0.05) affected by K application for any yearsite combination. Similarly, corn ear leaves at silking contained adequate K (20 to 30 mg kg<sup>-1</sup>), although these concentrations varied with K application rate on the two sandier soils. In the zero K plots, dilute double acid-extractable K concentrations ranged from 56 to 194 mg kg<sup>-1</sup> at the start of the study, and had declined by 29 to 45% by the end of the growing season. Evidence was obtained for both leaching of applied K and conversion to nonexchangeable forms. The lack of observed yield response was ascribed to (i) modest crop removal of K when corn is harvested only for grain, (ii) adequate K-buffering capacity of these soils to meet high crop demands during the growing season, and/or (iii) availability of significant quantities of subsoil K. Our results further suggested that, despite the high grain yields obtained, current recommendations by several state soil testing laboratories in the region are, if anything, somewhat excessive in that K fertilizer is recommended even when no yield response is observed. Soil Science Society of America journal. Mar/Apr 1989. v. 53 (2). p. 397-401. Includes references. (NAL Call No.: DNAL 56.9 S03).

1403

**Reducing nitrogen applications to manured corn an opportunity to save money and protect the environment /Thomas Legg ... et al.**  
Legg, Thomas D. St. Paul, Minn. : Dept. of Agricultural and Applied Economics, University of Minnesota, 1990. "March 1990." 24, 36 leaves : charts ; 28 cm. Includes bibliographical references. (NAL Call No.: DNAL HD1761.A1M5 no.90-28).

1404

**Reseeding potential of crimson clover as a cover crop for no-tillage corn.**  
AGUOAT. Myers, J.L. Waggoner, M.G. Madison, Wis. : American Society of Agronomy. Leguminous cover crops can provide biologically fixed N to a subsequent corn (*Zea mays L.*) crop as well as erosion control and moisture conserving mulch, but establishment is costly and often unsuccessful. A field experiment was conducted for 3 yr to determine the self-reseeding potential of crimson clover (*Trifolium incarnatum L.*) and its N contribution in a no-tillage corn production system. Four cover crop management treatments (fallow, annual-seeded, volunteer-reseeded, and volunteer strip-reseeded) were combined factorially with four fertilizer-N rates (0, 50, 100, or 150 kg ha<sup>-1</sup>) applied to the subsequent corn crop. The annual-seeded, volunteer-reseeded, and volunteer strip-reseeded clover treatments were desiccated at corn planting. Averaged over 3 yr, crimson clover dry matter was 2.6, 4.2, and 3.5 Mg ha<sup>-1</sup> for the annual-seeded, volunteer-reseeded, and strip-reseeded treatments, respectively. In 1988 and 1989, cover crop treatments produced mean corn grain yields of 6.0 and 6.1 Mg ha<sup>-1</sup> compared to fallow treatment yields of 3.4 and 4.0 Mg ha<sup>-1</sup>, respectively. This same pattern was reflected in the silage yields and total corn N uptake. Corn grain yields were unaffected by fertilizer-N rate in two out of 3 yr due to limited rainfall. Both self-reseeding treatments successfully reestablished each year and increased corn yields primarily by a mulching effect. Allowing crimson clover to mature before chemical desiccation or leaving strips between corn rows to produce seed appear to be effective methods of reseeding clover in a no-tillage corn silage production system. Agronomy journal. Nov/Dec 1991. v. 83 (6). p. 985-991. Includes references. (NAL Call No.: DNAL 4 AM34P).

1405

**Residual effects of nitrogen fertilization and winter cover cropping on nitrogen availability.**  
SSJD4. McCracken, D.V. Corak, S.J.; Smith, M.S.; Frye, W.W.; Blevins, R.L. Madison, Wis. : The Society. Long-term management practices affect the reserve of mineralizable soil N, and so can influence the amount of supplemental N fertilizer required in crop production. This study was conducted to (i) evaluate the

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residual effects of long-term N fertilization and winter cover cropping on corn (*Zea mays L.*) N nutrition, and (ii) examine the ability of selected soil indices to detect management-induced differences in soil N availability. In 1986, N fertilizer and winter cover crops were eliminated from plots which, from 1976 through 1985, had received varying tillage treatments, N fertilizer additions, and either hairy vetch (*Vicia villosa Roth*), rye (*Secale cereale L.*), or no winter cover crop. A history of N fertilization increased corn yield and N uptake (by an average of 20.4 kg N/ha). A history of winter cover cropping with hairy vetch increased corn yield and N uptake (by an average of 28.0 kg N/ha). Rye cover cropping generally had small or inconsistent effects relative to no cover crop. Tillage generally had insignificant effects on corn yield and N uptake. Soil N availability indices were determined on surface samples (0-15 cm) taken 2 wk after corn planting. The anaerobic incubation provided a poor index of N availability. Total soil C and Kjeldahl N were affected by tillage, though not by cover crop or fertilization history, and were marginally correlated with crop response. The autoclave index was only slightly superior to total soil C and Kjeldahl N as a N-availability index. The soil NO<sub>3</sub>-N concentration was highly correlated with corn yield, and N uptake. Though this study was conducted for 1 yr at one site, results indicate that measurement of surface soil NO<sub>3</sub>-N made shortly after corn planting can provide a valid index of the effects of past crop and soil management practices on soil N availability to corn. Soil Science Society of America journal. Sept/Oct 1989. v. 53 (5). p. 1459-1464. Includes references. (NAL Call No.: DNAL 56.9 S03).

1406

### Response of corn hybrids to nitrogen management and environment.

Anderson, I.C. Ames, Iowa : The Service. PM - Iowa State University, Cooperative Extension Service. In the series analytic: Integrated Farm Management Demonstration Program. 1990 Progress Report. Jan 1991. (1417). p. 69-72. Includes references. (NAL Call No.: DNAL 275.29 IO9PA).

1407

**Response of irrigated corn to sulfur fertilization in the Atlantic Coastal Plain.**  
SSSJD4. Kline, J.S. Sims, J.T.; Schilke-Gartley, K.L. Madison, Wis. : The Society. Accurate prediction of yield response by corn (*Zea Mays L.*) to S fertilization on the coarse-textured soils of the Atlantic Coastal Plain requires information on availability and persistence of subsoil SO<sub>4</sub>-S, potentially mineralizable soil S, and S added in irrigation and precipitation. A 3-yr study was conducted with irrigated corn on four soils possessing characteristics commonly associated with S deficiency. A factorial combination of S application rate (0, 33, 67, 101 kg ha<sup>-1</sup>) and

method (single broadcast at planting, split) was used. Grain yield, and S concentrations and N/S ratios of early whole plants (EWP) and ear leaves (EL) were determined. Extractable SO<sub>4</sub>-S (0-100 cm) levels and inputs of S from irrigation and precipitation were measured in each year; mineralizable S in Ap horizons of all soils was determined by two incubation methods (leached and nonleached). Although application of S generally increased plant S concentrations, significant yield increases occurred in only three of the 12 site-year combinations. Critical values for S and N/S, based on combined data from responsive sites, were 2.1 and 1.6 g S kg<sup>-1</sup> and 18.7 and 20.3, for EWP and EL, respectively. Lack of yield response was attributed to subsoil SO<sub>4</sub>-S, (average, 0-100 cm = 170 kg S ha<sup>-1</sup>, mineralizable S (average = 80 kg ha<sup>-1</sup>, leached method) and S contained in irrigation or precipitation (annual average = 7.5 kg ha<sup>-1</sup>). Yield increases obtained at the most responsive site may have been caused by increased immobilization of S, due to no-tillage management, the presence of a physical barrier to root penetration at 40 to 60 cm, or subsoil A1. successful prediction of corn response to S fertilization in Coastal Plain soils will require a comprehensive program that combines subsoil sampling and selective plant analysis, concentrated on sites identified as potentially responsive based on soil properties. Soil Science Society of America journal. July/Aug 1989. v. 53 (4). p. 1101-1108. Includes references. (NAL Call No.: DNAL 56.9 S03).

1408

**Response of western corn rootworm-infested corn to nitrogen fertilization and plant density.**  
CRPSAY. Spike, B.P. Tollefson, J.J. Madison, Wis. : Crop Science Society of America. Growth response of corn (*Zea mays L.*) to corn rootworm (*Diabrotica spp.*) infestation is poorly understood and may be influenced by management practices and environmental conditions. The objectives of this 2-yr experiment were to determine the effect of three N rates (0, 168, and 336 kg ha<sup>-1</sup>) and three plant density treatments (39 000 1984 only, 63 000, and 87 000 plants ha<sup>-1</sup> on dry-matter accumulation and partitioning of corn plants infested with three levels of western corn rootworm (WCR, *Diabrotica virgifera LeConte*) 0, 1967, and 3934 eggs m<sup>-1</sup> row. Plant dry weight taken periodically and subdivided into vegetative and reproductive fractions, was used to calculate the harvest index and mean relative growth rates (Rt). In 1985, leaf area was measured and leaf area index (LAI), mean net assimilation rate (NAR), and leaf area ratio (LAR) were calculated. In 1985, a dry year, rootworm-injured plants had significantly reduced dry weight, leaf area, harvest index, Rt, and NAR. Dry-matter accumulation of injured plants was greater in low plant-density and applied-N treatments. In comparison with parameters of healthy plants, dry weight, Rt, and NAR of injured plants were reduced in high-N treatments at the time of rootworm feeding. This significant rootworm X N interaction did not occur after feeding ceased.

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Rootworm infestation significantly reduced the harvest index only in 1985, suggesting that dry conditions increase the impact of root injury on ear development and yields. Crop science. May/June 1991. v. 31 (3). p. 776-785. Includes references. (NAL Call No.: DNAL 64.8 C883).

1409

### **Soil denitrification and nitrification potentials during the growing season relative to tillage.**

SSJD4. Staley, T.E. Caskey, W.H.; Boyer, D.G. Madison, Wis. : The Society. Soil management practice, through the alteration of various biological processes, can have a profound effect on nutrient availability to crops. During the growing season, the effect of no-tillage (NT) or conventional tillage (CT), location (between or within row), and N rate (0 or 56 kg N ha<sup>-1</sup>) on soil potential denitrification activity (PDA) and potential nitrification activity (PNA) was investigated. A Gilpin silt loam (fine-loamy, mixed, mesic Typic Hapludults) was selected and maize (*Zea mays L.*) was planted. For both PDA and PNA, most of the activity was concentrated in the soil surface (0-3.8-cm) layer, especially under NT, and decreased to barely detectable levels in the deepest (15-30-cm) layer examined. Significant main effects were found for tillage, season, and location for PDA in the soil surface layer. Tillage interacted only with season, resulting in an increase in PDA under NT, and a lack of response under CT, during the growing season in both the soil surface and the 3.8- to 7.6-cm layers. For PNA in the soil surface layer, significant main effects were found for all treatments. Only location interacted with tillage, resulting in a 50% increase in PNA from within rows to between rows under NT, and a lack of response under CT. In the 3.8- to 7.6-cm layer, the lowest order interaction was significant. In the 7.6- to 15-cm layer, PNA increased more rapidly under CT than NT during the growing season. These results demonstrate the importance of considering spatial distribution and time when these microbial activities are examined in tillage studies, and suggest that N losses under NT should exceed those under CT. Soil Science Society of America journal. Nov/Dec 1990. v. 54 (6). p. 1602-1608. Includes references. (NAL Call No.: DNAL 56.9 S03).

1410

### **Soil microbial populations and activities under conventional and organic management.**

JEVQAA. Fraser, D.G. Doran, J.W.; Sahs, W.W.; Lesoing, G.W. Madison, Wis. : American Society of Agronomy. Evaluation of microbial populations and activities, and their relationship to N cycling in soils under organic and conventional farm management was conducted in eastern Nebraska in 1981 and 1982, on an experiment initiated in 1975. The experimental treatments consisted of 3 x 4 factorial with three management systems (organic, fertilizer only, and fertilizer plus

herbicide) for a 4-yr grain/legume crop rotation plus one treatment of continuous corn (*Zea mays L.*) receiving fertilizer, herbicide, and insecticide including one subplot without insecticide. Soil physical, chemical, and microbiological characterization were made at soil depth intervals of 0 to 7.5, 7.5 to 15, and 15 to 30 cm. Soil chemical properties were significantly influenced by chemical management, primarily the application of beef (*Bos taurus*) feedlot manure in the organic management system. Total organic C, Kjeldahl N, and potentially mineralizable N in manure-amended surface soils (0-7.5 cm) were 22 to 40% greater than nonmanured soils receiving fertilizer and/or herbicide. Soluble P levels were eightfold greater in manure-amended surface soils, and soil nitrate levels after harvest in 1981 were two- to threefold greater to a depth of 30 cm than nonmanured chemical treatments. Soil microbial biomass, bacterial and fungal counts, dehydrogenase activity, and CO<sub>2</sub> evolution were greater in soils planted to oat/clover (*Avena sativa L./Trifolium pratense L. + Melilotus officinalis Lam.*) and treatments receiving manure. Increases in microbial populations and their activities paralleled increases in soil organic C content, Kjeldahl N, and water-filled pore space. Differences in N<sub>2</sub> fixation and denitrification between crops and management systems were minimal-possibly resulting from suboptimal water availability at midseason sampling. No significant differences were found in measured soil physical, chemical, or biological properties due to herbicide or insecticide at field application rates. Journal of environmental quality. Oct/Dec 1988. v. 17 (4). p. 585-590. Includes references. (NAL Call No.: DNAL QH540.J6).

1411

### **Sustaining soil nitrogen for corn using hairy vetch cover crop.**

AGJOAT. Utomo, M. Frye, W.W.; Blevins, R.L. Madison, Wis. : American Society of Agronomy. Nitrogen fertility management is often complicated by inadequate supply, low efficiency, high losses, and the potential of polluting water resources. This study was conducted in 1984 and 1985 on a Maury soil (fine, mixed, mesic Typic Paleudalfs) in Kentucky to determine the role of a hairy vetch (*Vicia villosa Roth*) cover crop in sustaining soil N for corn (*Zea mays L.*) under no-tillage and conventional tillage. Winter cover treatments of hairy vetch, rye (*Secale cereale L.*), and corn residue were combined factorially with N rates of 0, 85, and 170 kg ha<sup>-1</sup> the two tillage systems. Total soil C and N in the 0- to 7.5-cm depth, averaged across treatments and sampling dates, were 21.8 and 2.07 g kg<sup>-1</sup>, respectively, in no-tillage and 16.6 and 1.70 g kg<sup>-1</sup> in conventional tillage. Values were 19.8 and 1.99 g kg<sup>-1</sup>, respectively, with hairy vetch and 18.8 and 1.80 g kg<sup>-1</sup> with rye. Conventional tillage caused rapid mineralization of soil N, as indicated by greater inorganic N approximately 6 wk after plowing. Nitrate apparently leached deeper into the soil under no-tillage than conventional tillage. Grain yield without N on the vetch treatment was

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essentially equal to yields with 170 kg N ha<sup>-1</sup> on the rye or corn residue treatments-6.75, 6.75, and 6.65 Mg ha<sup>-1</sup>, respectively. Grain yield with vetch and 170 kg N ha<sup>-1</sup> was 7.85 Mg ha<sup>-1</sup>. Although vetch provided a substantial amount of N, results suggested that to obtain optimum corn yields N fertilization should be reduced little, if any, with a vetch cover crop. Vetch appeared to add grain yield instead of reduce the need for N fertilizer. Agronomy journal. Sept/Oct 1990. v. 82 (5). p. 979-983. Includes references. (NAL Call No.: DNAL 4 AM34P).

1412

### Tillage and cover crop management for soil water conservation.

AGQOAT. Munawar, A. Blevins, R.L.; Frye, W.W.; Saul, M.R. Madison, Wis. : American Society of Agronomy. The effectiveness of a conservation tillage system depends on the amount and distribution of plant residues left on the soil surface. We determined effects of tillage systems, N fertilizer rates, and cover crop management on soil temperature, soil moisture, and corn (*Zea mays L.*) yields. Tillage treatments were chisel-plow tillage, conventional tillage (moldboard plowing and disk) disk tillage, and no-tillage Nitrogen fertilizer at rates of 0, 75, 150, or 225 kg N ha<sup>-1</sup> were broadcast on the soil surface. Rye (*Secale cereale L.*) on one-half of each split plot was killed 3 wk before corn planting time, while the other half was allowed to grow until the corn was planted. Corn yields in 1986 were 4.41, 4.03, 3.64, and 2.25 Mg ha<sup>-1</sup> for no-tillage, chisel-plow tillage, disk tillage, and conventional tillage, respectively. The yields were significantly greater with early killed rye (3.85 and 5.05 Mg ha<sup>-1</sup> in 1986 and 1987, respectively) than with late-killed rye (3.32 and 4.58 Mg ha<sup>-1</sup> in 1986 and 1987, respectively). Soil temperature tended to be slightly higher under the late-killed rye mulch in 1986 with no significant difference in 1985. Soil moisture content was significantly higher for early killed rye treatment in the early part of the season in 1986 because there was less soil moisture depletion due to the growing rye. Agronomy journal. July/Aug 1990. v. 82 (4). p. 773-777. Includes references. (NAL Call No.: DNAL 4 AM34P).

1413

### Tillage effects on availability of nitrogen to corn following a winter green manure crop.

SSJD4. Sarrantonio, M. Scott, T.W. Madison, Wis. : The Society. Field studies were conducted in 1984 through 1986 to investigate the release of inorganic N to corn (*Zea mays L.*) following a winter annual green manure crop of hairy vetch (*Vicia villosa Roth*) that had either been plowed down to 22 cm (conventional tillage, CT), or killed and left on the surface (no-till, NT). Soil samples were taken regularly throughout the season at three depths (0-7.5 cm, 7.5-22 cm and 22-45 cm) and analyzed for inorganic N. Crop growth and N uptake, as

well as various other plant, soil and environmental parameters were also monitored. First year data (1985) show that soil inorganic N concentration in vetch treatments was higher under CT than NT, and it was more evenly distributed throughout the plow layer. Both corn yields and N uptake, however, were significantly higher in the NT system, probably because of higher soil moisture content in a dry summer. Vetch did not stimulate significant yield increases over O-N control plots in either tillage system, although there was greater N uptake by corn in vetch treatments. Under NT, 29% of the original N in the above-ground vetch biomass was measured either as soil inorganic N or corn N. Under CT, 56% of the original vetch N was measured. A repeat of the first experiment was conducted in 1986. Again, higher levels of inorganic N occurred under CT than under NT where vetch had been grown. Contrary to the results of 1985, corn yields were significantly higher in CT treatments than NT treatments at all N levels, and both corn yield and N uptake were significantly higher in vetch treatments than control treatments under both tillage systems. Maximum inorganic N levels were measured in late October in 1986, when 22% and 55% of the original vetch N was measured under NT and CT tillage systems, respectively. Soil Science Society of America journal. Nov/Dec 1988. v. 52 (6). p. 1661-1668. Includes references. (NAL Call No.: DNAL 56.9 S03).

1414

### Tillage effects on sediment and soluble nutrient losses from a Maury silt loam soil.

JEVQAA. Blevins, R.L. Frye, W.W.; Baldwin, P.L.; Robertson, S.D. Madison, Wis. : American Society of Agronomy. As the role of nonpoint-source contamination of surface waters becomes more evident, increasingly more attention is focused on the effects of agricultural practices on soil erosion and water quality. Tillage systems are known to affect the amount of water moving over the surface and through the soil. This study compared the contributions of three tillage systems used in corn (*Zea mays L.*) production with (i) sediment losses and surface runoff and (ii) the potential for nonpoint-source surface water pollution from N and P fertilizers and triazine herbicides. Tillage treatments were no-tillage, chisel-plow tillage, and conventional tillage (moldboard plow plus secondary tillage). The study site was on a Maury silt loam (Typic Paleudalfs). Over the 4-yr period, conventional tillage runoff volume was 576.7 kL ha<sup>-1</sup>, chisel-plow 205.7 kL ha<sup>-1</sup>, and no-tillage 239.9 kL ha<sup>-1</sup>. Total soil loss from conventional tillage was 19.79 Mg ha<sup>-1</sup>, chisel plow 0.71 Mg ha<sup>-1</sup>, and no-tillage 0.55 Mg ha<sup>-1</sup>. Amounts of NO<sub>3</sub>(-), soluble P, and atrazine leaving the plots in surface runoff were greatest from conventional tillage and about equal from chisel-plow and no-tillage. The magnitudes of the losses in surface runoff water were small for all chemicals measured. Journal of environmental quality. Oct/Dec 1990. v. 19 (4). p. 683-686. Includes references. (NAL Call No.: DNAL QH540.J6).

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1415

### Tissue test for excess nitrogen during corn production.

AGJOAT. Binford, G.D. Blackmer, A.M.; El-Hout, N.M. Madison, Wis. : American Society of Agronomy. Seeming conflict between the need to use N fertilizers and the need to protect groundwater quality requires better tools for distinguishing between fertilizer applications that are essential and those that are excessive. Studies were conducted to evaluate NO<sub>3</sub>- concentration in corn (*Zea mays L.*) stalks at physiological maturity as the basis for a tissue test to characterize degree of N excess during corn production. Samples of the lower portion of corn stalks were collected from plots in N-rate experiments at 18 site-years in Iowa. Observed relationships between grain yields and stalk NO<sub>3</sub>- concentrations indicated sharp breaks between NO<sub>3</sub>- concentrations that were not adequate and those that were adequate for obtaining maximum or near-maximum yields. When yields were near maximum, stalk NO<sub>3</sub>- concentrations increased linearly with amounts of N fertilizer applied. Stalk samples collected at various times after black layering showed that NO<sub>3</sub>- concentrations remained constant for at least 2 wk. These observations suggest that stalk NO<sub>3</sub>- concentration offers great potential as the basis for a tissue test to characterize degree of N excess during corn production. *Agronomy journal*. Jan/Feb 1990. v. 82 (1). p. 124-129. Includes references. (NAL Call No.: DNAL 4 AM34P).

1416

### Uncertainty and split nitrogen application in corn production.

Feinerman, E. Choi, E.K.; Johnson, S.R. Ames, Iowa : American Agricultural Economics Association. The split application of nitrogen provides insurance against the risk that late spring application will be infeasible because of wet soil. Risk aversion and production uncertainty have little impact on total nitrogen available to the crop but do affect the split in application and the total nitrogen applied. A risk-averse farmer applies more (less) nitrogen prior to planting and total nitrogen than a risk-neutral farmer if nitrogen and water are substitutes (complements). For the case of substitutes, the nitrogen lost through leaching is the premium which the risk-averse farmer pays to insure a proper level of nitrogen. *American journal of agricultural economics*. Nov 1990. v. 72 (4). p. 975-984. Includes references. (NAL Call No.: DNAL 280.8 J822).

# SOIL CULTIVATION

1417

**Age structure and community diversity of nematodes associated with maize in Iowa sandy soils.**

JONEB. Norton, D.C. Edwards, J. Raleigh, N.C. : Society of Nematologists. *Journal of nematology*. July 1988. v. 20 (3). p. 340-350. Includes references. (NAL Call No.: DNAL QL391.N4J62).

1418

**Allelopathic potential of legume debris and aqueous extracts.**

WEESA6. White, R.H. Worsham, A.D.; Blum, U. Champaign, Ill. : Weed Science Society of America. *Cotton and pitted morningglory emergence and dry weight decreased approximately 60 to 80% when these plants were grown under greenhouse conditions in the presence of increasing amounts (0.8 to 6.7 mg debris/g soil) of field-grown crimson clover or hairy vetch debris incorporated into the soil medium. Conversely, corn dry weight increased 20 to 75% when legume debris was placed on the soil surface; incorporated debris had very little effect on corn emergence or dry weight. Germination and seedling growth of corn, Italian ryegrass, cotton, pitted morningglory, and wild mustard decreased progressively, with species-dependent variation, when exposed to increasing concentrations (8.3 to 33.3 g debris/L) of aqueous crimson clover and hairy vetch extract. Mustard and ryegrass germination and growth were almost completely inhibited by full-strength extracts of both legumes. Bioassay species exhibited greater phytotoxic responses to hairy vetch than to crimson clover in the debris and extract studies. Emergence and growth of corn and cotton were not affected when planted into soil samples, containing root biomass and possible leaf and root exudates, collected from beneath field-grown hairy vetch and crimson clover plants. However, morningglory dry weight increased 35% in the presence of either legume root debris and accompanying soil. Weed science. Sept 1989. v. 37 (5). p. 674-679. Includes references. (NAL Call No.: DNAL 79.8 W41).*

1419

**Analysis of net returns to conservation tillage systems for corn and soybeans in northeast Kansas.**

KSCBA. Williams, J.R. Llewelyn, R.V.; Gross, L.K.; Long, J.H. Manhattan, Kan. : The Station Bulletin - Kansas Agricultural Experiment Station. Apr 1989. (654). 27 p. Includes references. (NAL Call No.: DNAL 100 Ki3S (i)).

1420

**Atrazine, bifenoxy, and shade effects on crownvetch (*Coronilla varia*) nodulation and nodule activity.**

WEESA6. Cardina, J. Hartwig, N.L. Champaign, Ill. : Weed Science Society of America. Studies were conducted to determine whether photosynthesis-inhibiting herbicides atrazine or bifenoxy, and shade affect the number, weight senescence, and N fixation activity of nodules on the roots of the perennial legume crownvetch. Atrazine and bifenoxy were applied at rates of 2.24 kg ai/ha to shaded and unshaded plots. The shade was varied during the growing season to simulate changing irradiance levels beneath a corn canopy. Atrazine and bifenoxy treatments reduced nodule number to 13 and 42% of the untreated control, respectively, in 1980, and 18 and 35% in 1981. Shade treatments reduced nodule number to a low of 40% of the control in 1980 and 50% in 1981. Combined effects of herbicides and shade on nodule numbers were more than additive. Nodule fresh weights were reduced an average of 37% by herbicide treatments and 39% by shade treatments. Sloughed nodule numbers decreased in the herbicide and shaded treatments, suggesting that the reduction in nodule numbers was due to fewer nodules being produced. Nodule numbers were reduced a greater percentage by herbicides and shade than was herbage dry matter production. Specific nodule activity (SNA) did not differ in nodules from the atrazine, bifenoxy, or shade treatments on the six sampling dates in 1980 or on two treatments of three sampling dates in 1981. Nomenclature: Atrazine, 6-chloro-N-ethyl-N'-(methylethyl)-1,3,5-triazine-2,4-diamine; bifenoxy, methyl 5-(2,4-dichlorophenoxy)-2-nitrobenzoate; crownvetch, *Coronilla varia* L. ~ CZRVA. Weed science. July 1988. v. 36 (4). p. 535-539. Includes references. (NAL Call No.: DNAL 79.8 W4i).

1421

**Combinations of nonselective herbicides for difficult to control weeds in no-till corn, *Zea mays*, and soybeans, *Glycine max*.**

WEESA6. Wilson, J.S. Worsham, A.D. Champaign, Ill. : Weed Science Society of America. The combination of glyphosate and 2,4-D at various rates was evaluated for controlling existing weeds at planting in no-till corn and soybeans. Herbicide combinations in soybeans also included paraquat plus 2,4-D linuron, or diuron. Standard treatments included glyphosate (0.6 and 1.1 kg ae/ha) and paraquat (0.3 and 0.6 kg ai/ha), and 2,4-D (0.6 kg ae/ha) alone. For corn, the addition of 2,4-D to glyphosate did not improve weed control, although the addition of 2,4-D to paraquat did improve horseweed control. Corn yield with the herbicide combinations was higher than that for the nonselective herbicides alone. Although initial weed control was good in soybeans, weed regrowth in all paraquat alone treatments was substantial, especially with horseweed. The addition of 2,4-D to paraquat improved control of horseweed and tall morningglory. The

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addition of linuron or diuron to paraquat improved horseweed and common ragweed control, whereas the addition of 2,4-D to glyphosate improved the control of tall morningglory but not the other weed species. Generally, after 4 weeks, all glyphosate treatments provided better horseweed control than all paraquat treatments. Paraquat plus either linuron or diuron and glyphosate alone or in combination with 2,4-D gave the highest soybean yields. Weed science. Sept 1988. v. 36 (5). p. 648-652. Includes references. (NAL Call No.: DNAL 79.8 W41).

1422

**Combining cultural practices and herbicides to control wild-proso millet (*Panicum miliaceum*).** WETEE9. Harvey, R.G. McNevin, G.R. Champaign, Ill. : The Society. Weed technology : a journal of the Weed Science Society of America. Paper presented at the "Symposium on Wild-Proso Millet," February 9, 1989, Dallas, Texas. Apr/June 1990. v. 4 (2). p. 433-439. Includes references. (NAL Call No.: DNAL SB610.W39).

1423

**Commodity programs and the internalization of erosion costs: Do they affect crop rotation decisions?**

Poe, G.L. Klemme, R.M.; McComb, S.J.; Ambrosious, J.E. East Lansing, Mich. : Michigan State University. This paper investigates the impact of commodity programs and the internalization of erosion costs on crop rotation decisions. Not surprisingly, commodity programs are found to shift decisions toward more erosive rotations. Internalization of on-site and off-site erosion costs calculated under real interest rates of 2 and 4 percent and planning horizons of 20 and 40 years affect rotation decisions under historical market conditions. Under conditions of commodity program participation, internalization of erosion costs affect rotation decisions only when lengthy time horizons (40 years) are considered. The impact of cross-compliance restrictions on rotation decisions is also examined. Review of agricultural economics. July 1991. v. 13 (2). p. 223-235. Includes references. (NAL Call No.: DNAL HD1773.A3N6).

1424

**Contribution of crownvetch with and without tillage to redroot pigweed control in corn.** PNWSB. Hartwig, N.L. Loughran, J.C. College Park, Md. : The Society. Proceedings of the annual meeting - Northeastern Weed Science Society. Meeting held on January 4-6, 1989, Baltimore, Maryland. 1989. v. 43. p. 39-42. Includes references. (NAL Call No.: DNAL 79.9 N814).

1425

**Control of legume cover crops in no-till corn (*Zea mays*) and cotton (*Gossypium hirsutum*).** WETEE9. White, R.H. Worsham, A.D. Champaign, Ill. : The Society. Weed technology : a journal of the Weed Science Society of America. Jan/Mar 1990. v. 4 (1). p. 57-62. Includes references. (NAL Call No.: DNAL SB610.W39).

1426

**Converting to organic grain crops.**

Sills, W. Davis, Calif. : U.C.D. Small Farm Center. Small farm news. May/June 1991. p. 6. (NAL Call No.: DNAL HD1476.U52C27).

1427

**Corn production in alfalfa sod following no-till and plow based field preparation.**

Krall, J.M. Smith, D.M.; Miller, S.D. S.I. : The Society. Research progress report - Western Society of Weed Science. Meeting held March 14-16, 1989, Honolulu, Hawaii. 1989. 282-283. (NAL Call No.: DNAL 79.9 W52R).

1428

**Corn residue effect on the yield of corn and soybean grown in rotation.**

AGJOAT. Crookston, R.K. Kurle, J.E. Madison, Wis. : American Society of Agronomy. Crop rotation provides a yield benefit that persists at optimal management levels. The exact reason for the rotation effect is unknown. One theory is that a given crop's own residue has an auto-inhibitory effect when that crop is maintained under monoculture, and/or that residues of alternate crops have a stimulatory effect on one another under rotation. We conducted field studies at Lamberton, Rosemount, and Waseca, MN to test this theory. Soils at these locations are: Webster clay loam (fine-loamy, mixed mesic Typic Haplaqueolls), Waukegan silt loam (fine-silty, over sandy, mixed mesic Typic Hapludolls), and Nicollet clay loam (fine-loamy, mixed, mesic Aquic Hapludolls), respectively. A series of 3-yr crop sequences were established at each site. In the first year the experimental area was kept fallow. In the second year half of each replicated plot was planted to corn (*Zea mays* L.) and half to soybean (*Glycine max* (L.) Merr.). After grain harvest all above-ground corn residue was removed from half of the corn area and transferred to half of the soybean area. All plots were then moldboard plowed. In the spring of the third year all plots were disked and planted uniformly in corn (1981, 1982) or soybean (1983, 1984). There was a significant effect of previous crop (rotation effect) on the yield of both corn and soybean, but the removal or addition of corn residue had no effect on the yield of either crop. This indicates that the yield response of corn and soybean to rotation is not due to beneficial or negative effects of decomposing above-ground

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residue. *Agronomy journal*. Mar/Apr 1989. v. 81 (2). p. 229-232. Includes references. (NAL Call No.: DNAL 4 AM34P).

1429

### Corn response to rye cover crop management and spring tillage systems.

AGJOAT. Rainbault, B.A. Vyn, T.J.; Tollenaar, M. Madison, Wis. : American Society of Agronomy. The use of a winter rye (*Secale cereale* L.) corn (*Zea mays* L.) double cropping sequence in combination with appropriate tillage practices could increase biomass production and reduce soil erosion potential in southern Ontario. A 3-yr study (1982-1984) was conducted at two locations to determine the potential of this sequence for double cropping, and to evaluate spring tillage systems and management of the rye residue on subsequent productivity of corn. Winter rye was planted in early October after corn silage harvest and either chemically killed or harvested as silage in the spring before corn planting. Rye treatments consisted of no rye, rye harvested in the spring and rye residue left on the plots. Spring cultivation treatments were no-till, tandem discing, and moldboard plowing followed by secondary tillage. The use of a winter rye cover crop delayed corn development and reduced corn biomass yield by 11% at the Elora location and by 17% at the Woodstock location. The adverse effect of the rye crop was more pronounced under no-till than where the soil was tilled. Removal or retention of the rye residue had no consistent effect on the subsequent corn crop. An allelopathic effect resulting from the rye crop may be one plausible explanation for the reduction in corn yield. Total biomass yield (rye + corn) was increased relative to corn alone, if the soil was cultivated. Therefore, a winter rye-corn sequence may still be of interest, despite a reduction in corn yield, especially if advantages such as total biomass production and the potential for decreased soil erosion during fall and winter are considered. *Agronomy journal*. Nov/Dec 1990. v. 82 (6). p. 1088-1093. Includes references. (NAL Call No.: DNAL 4 AM34P).

1430

### Corn response to rye cover crop, tillage methods, and planter options.

AGJOAT. Raimbault, B.A. Vyn, T.J.; Tollenaar, M. Madison, Wis. : American Society of Agronomy. Studies in Ontario have shown that corn (*Zea mays* L.) yields are reduced when corn is seeded immediately after rye (*Secale cereale* L.) harvest or chemical kill of winter rye. A study was conducted in 1983 and 1984 on a Maryhill (Typic Hapludalf) loam soil to determine the effect of spring tillage systems and timing of rye chemical kill on the subsequent corn crop. The rye was seeded in early October after corn silage harvest. The tillage treatments consisted of (i) moldboard plow plus secondary tillage, (ii) strip tillage, (iii) no-tillage with ripple coulters

(iv) no-tillage with disc furrowers plus plow coulters, and (v) no-tillage with ripple coulters plus plow coulters. The rye kill treatments were early (2 wk before planting) or late (just prior to corn planting). Corn whole-plant yields averaged 13.6 and 12.4 Mg ha<sup>-1</sup> for early and late rye kill, respectively. Corn yield in the moldboard plow treatment was higher than in strip tillage and the average of no-till treatments; however, using disc furrowers produced yields equal to those with the moldboard plow treatment. Moving the residue out of the row with disc furrowers resulted in corn yields that were significantly higher than those in no-till treatments with ripple coulters. The improvement in plant growth due to an early rye kill (as opposed to a late rye kill) was often greater with the conservation tillage systems relative to the moldboard plow treatment. A crop production system is proposed involving chemical control of a winter rye cover crop 2 wk before corn planting and planting the corn with a modified no-till system that removes rye residue from the row area. *Agronomy journal*. Mar/Apr 1991. v. 83 (2). p. 287-290. Includes references. (NAL Call No.: DNAL 4 AM34P).

1431

### Corn response to seed-row residue removal.

SSSJD4. Kaspar, T.C. Erbach, D.C.; Cruse, R.M. Madison, Wis. : The Society. No-till corn (*Zea mays* L.) yields in the central Corn Belt often are limited by slow soil warming caused by surface crop residues. A 3-yr experiment with a split-plot design was conducted near Ames, IA, to determine corn response to seed-row residue removal. Whole-plot treatments were a factorial combination of two tillage systems (no-till and moldboard plow) and three residue types (corn, soybean *Glycine max* (L.) Merr., and fiberglass insulation). Residue was removed from bands of various widths (0, 8, 16, 32, and 76 cm) centered on the seed row for five split-plot treatments. Corn seedlings reached 50% emergence 0.5 d earlier in plots with soybean residue than in those with corn residue. No-till seedlings reached 50% emergence 0.8 d sooner and 50% tasseling 0.9 d sooner than in the mold-board-plow system. Residue removal from the seed row had greater effects on plant growth and yield than either tillage or residue type. Seed-row residue removal reduced days to 50% emergence and tasseling, increased plant height, decreased grain moisture and barrenness, and increased yield. Removing residue from a 16-cm wide band resulted in corn yields that were only 3% less than those from bare soil. Plant responses to width of the residue-free band were described by logarithmic functions. Seed-row residue removal may allow a compromise between erosion protection and crop yield. *Soil Science Society of America journal*. July/Aug 1990. v. 54 (4). p. 1112-1117. Includes references. (NAL Call No.: DNAL 56.9 S03).

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1432

### Cornfield traffic cops.

Reichenberger, L. Philadelphia, Pa. : The Journal. Farm journal. Feb 1989. v. 113 (3). p. 18-19. ill. (NAL Call No.: DNAL 6 F2212).

1433

### Cover crop and herbicide influence on row crop seedling establishment in no-tillage culture.

WEESA6. Weston, L.A. Champaign, Ill. : Weed Science Society of America. The establishment and management of nine cover crops in Kentucky production systems were evaluated in field experiments over a 2-yr period. 'Wheeler' rye, 'Barsoy' barley, and 'Tyler' wheat cereal grains produced greater biomass (180 to 260 g/m<sup>2</sup>) than the pasture species tall fescue, creeping red fescue, and white clover (55 to 110 g/m<sup>2</sup>). 'Kentucky 31' tall fescue, creeping red fescue, and white clover proved most difficult to control, and significant regrowth occurred regardless of herbicide or rate applied. HOE-39866 (1.7 kg ai/ha) was effective in rapidly controlling all cover crops except tall fescue by 30 days after application. Sethoxydim and fluazifop (0.4 and 0.3 kg ai/ha, respectively) effectively controlled the cereals and two ryegrass species. Glyphosate applied at 1.1 and 2.2 kg ai/ha was also effective, while 0.6 kg ai/ha controlled only cereal grain growth adequately. After chemical control, pasture grass plots contained fewest weeds/m<sup>2</sup> with some reductions likely due to density and regrowth of the sods. Cover crops were effective in suppressing weed growth at 45 days after chemical control. However, significant weed growth existed in all cover crop plots by 60 days after kill. Row crop establishment increased linearly with increasing glyphosate rate. Cereal grain covers provided the most compatible planting situations for greatest seedling establishment, with rye and wheat providing greatest weed suppression. Generally, increased weed suppression provided by a cover crop was accompanied by reduced row crop establishment, with greatest reductions observed in pasture grass plots. Cucumber was most easily established while snap pea was most difficult. Weed science. Mar 1990. v. 38 (2). p. 166-171. Includes references. (NAL Call No.: DNAL 79.8 W41).

1434

### Cover crop management and nitrogen rate in relation to growth and yield of no-till corn.

AGJOAT. Waggoner, M.G. Madison, Wis. : American Society of Agronomy. Cover crop management in no-tillage systems prior to planting the principal crop can be an important tool in maximizing the beneficial effects of the cover crop on the principal crop. A field experiment was conducted in 1984 and 1985 to examine timing effects of cover crop desiccation relative to corn planting early desiccation/early plant (EE), early desiccation/late plant (EL), and late

desiccation/late plant (LL) and fertilizer N (0, 100, and 200 kg ha<sup>-1</sup>) on corn growth and yield. These management schemes were evaluated for fallow, rye (*Secale cereale* L.), crimson clover (*Trifolium incarnatum* L.), and hairy vetch (*Vicia villosa* Roth.) cover crop systems. Corn dry matter production and N uptake, monitored in all 0 kg N ha<sup>-1</sup> treatments, were significantly affected by cover crop management and varied according to stage of development and climatic conditions. Cover crop type had a pronounced effect on corn growth, with corn dry matter production in a rye cover crop lower than in legume cover crops. Grain yield response to applied N was greatest in a rye cover crop system. In contrast, a grain yield response up to the first increment of fertilizer N (100 kg ha<sup>-1</sup>) in legume cover crop systems was observed only in 1984. Corn recovery of legume N was estimated at 40 to 45 kg N ha<sup>-1</sup> (2-yr avg.), representing approximately 36 and 30% of the total N content of crimson clover and hairy vetch, respectively. These data indicate that winter annual legume cover crops are capable of providing a substantial portion of the N required by corn. Additionally, cover crop management should insure that corn planting is not delayed to allow for additional legume growth and N production. Agronomy journal. May/June 1989. v. 81 (3). p. 533-538. Includes references. (NAL Call No.: DNAL 4 AM34P).

1435

### Crop rotation and tillage effects on soil organic carbon and nitrogen.

SSSJD4. Havlin, J.L. Kissel, D.E.; Maddux, L.D.; Claassen, M.M.; Long, J.H. Madison, Wis. : The Society. Sustaining or increasing soil productivity depends in part on soil and crop management practices that maintain or increase soil organic matter. This study was conducted to determine the effects of tillage/crop rotation, and fertilizer N on soil organic C and N. Two long-term tillage/rotation studies and one long-term rotation/N-rate study were conducted on eastern Kansas soils. Soils were sampled from conventional (CT) and no-tillage (NT) treatments applied to continuous sorghum *Sorghum bicolor* (L.) Moench (S/S), continuous soybean *Glycine max* (L.) Merr. (B/B), and sorghum-soybean (S/B) rotations in the tillage/rotation studies and from the 0 and 252 kg N ha<sup>-1</sup> treatments on continuous corn (*Zea mays* L.) (C/C), B/B, and corn-soybean (C/B) rotations in the rotation/N-rate study. Organic C and N were determined on soils sampled at depths of 0 to 2.5, 2.5 to 7.5, 7.5 to 15, and 15 to 30 cm. Compared with CT, NT had greater organic C and N contents. Compared with B/B, S/B and S/S increased organic C and N under NT and, to a lesser extent, under CT (at 0-2.5-cm depth). Increases in organic C and N with NT compared with CT and with sorghum rotations compared with B/B were directly related to the quantity of residue produced and left on the soil surface (S/S > S/B / > B/B). Fertilizer N increased soil organic C and N only slightly. Crop management systems that include rotations with high residue-producing crops and maintenance of surface residue cover with

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reduced tillage result in greater soil organic C and N, which may improve soil productivity. Soil Science Society of America journal. Mar/Apr 1990. v. 54 (2). p. 448-452. Includes references. (NAL Call No.: DNAL 56.9 S03).

1436

### Crop rotations: still the norm.

Foulke, J. Washington, D.C. : The Service. Farmline - U.S. Department of Agriculture, Economic Research Service. May 1990. v. 11 (5). p. 4-6. (NAL Call No.: DNAL aHD1401.A2U52).

1437

### Developmental and growth effects of crop residues on corn.

AGJOAT. Fortin, M.C. Pierce, F.J. Madison, Wis. : American Society of Agronomy. Residue-related low soil temperatures have been shown to delay corn (*Zea mays L.*) emergence and silking dates, but it is unclear how residues affect general crop growth during this period. This study was conducted to determine how crop-residue effect on corn development during the vegetative stage affects the measurements of various growth characteristics. The effects of small grain residue cover applied around 50% emergence on corn development (time to reach specific stages), growth (aboveground phytomass, height, N uptake) and soil temperatures were investigated on a Conover loam (mixed, mesic, Udoillic Ochraqualf) under irrigated no-tillage conditions. In 1987 and 1988, straw mulch significantly delayed development when compared to a bare soil control, but no consistent difference was found in aboveground phytomass when comparisons were done at similar vegetative stages. Comparisons on a calendar day basis showed significantly lower values for the residue treatment. The latter analysis confounded developmental-delay effects with actual growth. Similar observations were made for height and N uptake. Consequently, an understanding of plant performance in tillage studies, involving significant developmental differences between treatments, requires that the response curve of a growth characteristic over time be coupled with data on development. Agronomy journal. July/Aug 1990. v. 82 (4). p. 710-715. Includes references. (NAL Call No.: DNAL 4 AM34P).

1438

### Distribution of the stalk borer *Paraipema nebris* (Lepidoptera: Noctuidae) in no-till corn.

JESCEP. Highland, H.B. Roberts, J.E. Sr. Tifton, Ga. : Georgia Entomological Society. Journal of entomological science. Oct 1989. v. 24 (4). p. 428-436. maps. Includes references. (NAL Call No.: DNAL QL461.G4).

1439

### Division S-8--fertilizer technology & use acidic zones from ammonia application in conservation tillage systems.

SSSJD4. Robbins, S.G. Voss, R.D. Madison, Wis. : The Society. Subsurface soil acidity resulting from repeated NH<sub>3</sub> applications in long-term conservation tillage systems that do not disturb the NH<sub>3</sub> injection zone was studied in six different crop-fertilizer-tillage systems by: (i) observation of the size, shape, and distribution of acidic zones in the field by using a pH color indicator method and (ii) intensive quantitative sampling of the upper 25- to 30-cm soil layer with subsequent laboratory analysis for soil pH. Acidic soil zones created by the nitrification of the injected NH<sub>3</sub> were roughly circular with 12- to 18-cm diam. Soil pH of the acidic zones was generally 0.9 to 1.8 pH units lower than that of the surrounding bulk soil. In the ridge till-plant and ridge slot-plant systems studied, a distinct highly localized persistent acidic soil zone was detected in each interrow. On the basis of the extent and degree of acidity observed, it is concluded that yield-limiting problems due to acidification by continuous NH<sub>3</sub> applications are not likely in the ridge management systems studied. In the flat no-till systems studied, numerous persistent acidic soil zones were observed scattered throughout each interrow. It is concluded that soil acidity problems due to long-term NH<sub>3</sub> usage potentially could develop in the no-till systems studied where NH<sub>3</sub> is not injected in the same vicinity each year. Efforts toward localized placement of N by the farm operator could effectively minimize potential problems due to the acidifying effects of NH<sub>3</sub> in conservation tillage systems. Soil Science Society of America journal. July/Aug 1989. v. 53 (4). p. 1256-1263. 111. Includes references. (NAL Call No.: DNAL 56.9 S03).

1440

### Early preplant and preemergence weed control programs for no-till corn production.

PNWSB. Webb, F.J. Johnson, Q.R. College Park, Md. : The Society. Proceedings of the annual meeting - Northeastern Weed Science Society. Meeting held January, 6-8, 1988, Hartford, Connecticut. 1988. v. 42 (suppl.). p. 23-24. (NAL Call No.: DNAL 79.9 N814).

1441

### Economic analysis of four weed management systems.

WEESA6. Lybecker, D.W. Schweizer, E.E.; King, R.P. Champaign, Ill. : Weed Science Society of America. An economic analysis of four weed management systems employed on four crop sequences in a barley-corn-pinto bean-sugarbeet rotation in eastern Colorado was computed. Weeds were controlled in each crop with only conventional tillage or conventional tillage plus minimum levels of herbicide (systems 3 and

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4), moderate levels of herbicides (system 1), or intensive levels of herbicides (system 2). Adjusted gross returns were higher for systems 3 and 4 where herbicide use was less/year and decreased over 4 yr than for systems 1 and 2 where herbicide use was higher/year and constant. When the four crop sequences were aggregated using yield and sucrose indices, the least herbicide-intensive weed management system had \$440/ha/4 yr higher indexed adjusted gross return than the most herbicide-intensive weed management system. An income risk analysis showed that the herbicide-intensive weed management system was not risk efficient and that producers would select one of the other three less herbicide-intensive weed management systems depending upon their risk preferences. Weed science. Nov 1988. v. 36 (6). p. 846-849. Includes references. (NAL Call No.: DNAL 79.8 W41).

1442

**The economics of alternative tillage systems, crop rotations, and herbicide use on three representative East-Central Corn Belt farms.** WEESA6. Martin, M.A. Schreiber, M.M.; Riepe, J.R.; Bahr, J.R. Champaign, Ill. : Weed Science Society of America. A linear programming model was used to determine which crop rotations and weed management systems result in the highest net farm income for each of three farm sizes (120, 240, and 480 hectares) under alternative tillage systems. Test plot data for the years 1981 through 1988 from the Purdue University Agronomy Farm, which has highly productive, well-drained soils, were analyzed. Net incomes for no-till tillage systems on all farms in the model were consistently and significantly lower than incomes for moldboard and chisel plow tillage systems due to slightly lower yields and substantially higher herbicide costs. Generally, net farm incomes were slightly higher with a moldboard plow versus chisel plow tillage system. Also, as farm size increased, per hectare net incomes increased. About 80% of the time under moldboard or chisel plow tillage systems, the model chose as optimal the lowest of three herbicide application rates. A corn/soybean rotation was chosen as optimal on 56% of the farm area analyzed, versus 25% for continuous corn and 13% for a corn/soybean/wheat rotation. Weed science. Apr/June 1991. v. 39 (2). p. 299-307. Includes references. (NAL Call No.: DNAL 79.8 W41).

1443

**Effect of atrazine and tillage on alfalfa (*Medicago sativa*) establishment in corn (*Zea mays*)-alfalfa rotation.** WETEE9. Kells, J.J. Leep, R.H.; Tesar, M.B.; Leavitt, R.A.; Cudnohufsky, J. Champaign, Ill. : The Society. Weed technology : a journal of the Weed Science Society of America. Apr/June 1990. v. 4 (2). p. 360-365. illl. Includes references. (NAL Call No.: DNAL SB610.W39).

1444

**The effect of climatic change on cropping structure of Shawnee County, Kansas: a Bayesian model.**

AGAIA. McGregor, K. Berkeley, Calif. : University of California Press. Agricultural history. Special symposium issue on Climate, Agriculture, and History / edited by D.C. Smith. Spring 1989. v. 63 (2). p. 202-216. Includes references. (NAL Call No.: DNAL 30.98 AG8).

1445

**Effect of conservation tillage on European corn borer (*Lepidoptera: Pyralidae*) populations.**

EVETEX. Berry, E.C. Ghidu, G.M. Lanham, Md. : Entomological Society of America. The influence of four tillage systems and two crop rotations on populations of first- and second-generation European corn borer, *Ostrinia nubilalis* (Hubner), was determined. In six of the eight years, populations of European corn borer were influenced by either crop rotation or tillage. It is suspected that population dynamics were directly affected by crop maturity at time of egg deposition and early larval establishment and development. Environmental entomology. Dec 1989. v. 18 (6). p. 917-920. Includes references. (NAL Call No.: DNAL QL461.E532).

1446

**Effect of early season temperatures on development of western corn rootworm immatures in No-till ridge and conventional tillage systems (*Coleoptera: Chrysomelidae*).**

JKESA. Gustin, R.D. Lawrence, Kan. : The Society. Journal of the Kansas Entomological Society. July 1989. v. 62 (3). p. 348-352. Includes references. (NAL Call No.: DNAL 420 K13).

1447

**Effect of fertilization method and tillage on nitrogen-15 recovery by corn.**

AGJOAT. Timmons, D.R. Cruse, R.M. Madison, Wis. : American Society of Agronomy. Fertilizer N utilization by corn (*Zea mays L.*) is influenced by different fertilizer management and tillage systems. A study was conducted in central Iowa during two consecutive years to evaluate the uptake and recovery of labeled N for continuous corn grown in two tillage systems with two fertilization methods. Tillage systems were fall moldboard-plow and ridge-till. Labeled N (5% 15N) as 28% urea-ammonium nitrate solution (UAN) was either surface-applied in the fall before any primary tillage or banded (knifed-in) between rows at 224 kg N ha<sup>-1</sup> just before planting. Depending on tillage and fertilization method, corn grain yields ranged from 1.3 to 7.3 Mg ha<sup>-1</sup> which were below normal due to adverse weather conditions during the two growing seasons. The percent of plant N derived from labeled N (Nf) in the sixth leaf

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(50% silk) and in mature grain, stover, and whole plants was significantly lower for fall surface-applied 15N than for spring banded 15N. For mature whole plants, Nf ranged from 9 to 59% and averaged 53% for spring banded and 17% for fall surface applied 15N. Labeled N recovery by mature corn grain was affected by fertilization method and growing season and ranged from 1 to 25% during the 2-yr period. Labeled N recovery by mature whole plants ranged from 2 to 41% and averaged four times greater for spring banded than for fall surface-applied 15N. About 1 yr after application, an average of 20% of the 15N remained in the soil profile; and 95% of the residual 15N was found in the organic N pool. Compared with spring banded N, fall surface-applied N was extremely inefficient for both tillage systems. *Agronomy journal*. July/Aug 1990. v. 82 (4). p. 777-784. Includes references. (NAL Call No.: DNAL 4 AM34P).

1448

### **Effect of long-term tillage systems and nitrogen addition on potassium quantity-intensity relationships.**

SSJD04. Evangelou, V.P. Blevins, R.L. Madison, Wis. : The Society. The no-tillage (NT) management of soils is expected to have an influence on the K<sup>+</sup> adsorption characteristics of these soils due to organic matter accumulation. The purpose of this study is to investigate this influence as affected by nitrogen (N) additions. The effect of 16 yr continuous corn (*Zea mays L.*) production under conventional tillage and no-tillage management on potassium quantity-intensity (Q/I) relationships was investigated on soil samples taken at 0-50 mm and 50-150-mm depths of a Maury silt loam (fine-silty, mixed, mesic Typic Paleudalfs) from central Kentucky. The results show that the Q/I plot components, labile K<sup>+</sup>, activity ratio for K<sup>+</sup> at equilibrium (AR<sub>Ko</sub>) and linear potential buffering capacity for K<sup>+</sup> (PB<sub>Ck</sub>) were affected by tillage and N additions. The no-tillage soil with and without N fertilizer had the highest quantity of labile K<sup>+</sup> at the 0-50 and 50-100-mm depth. The AR<sub>Ko</sub> was also the highest for the no-tillage with and without N in comparison to conventional tillage for the two depths. The highest PB<sub>Ck</sub> value was that of conventional tillage no N at the 0-50-mm depth. The lowest PB<sub>Ck</sub> value was that of no-tillage no N also at the 0-50-mm depth. The BaC12 CEC determination along with the relative affinity for K<sup>+</sup> (determined from the slope of plots of ExK/CEC vs. AR<sub>K</sub>; where ExK = BaC12 extractable K<sup>+</sup>) were the best predictors of the relationship PB<sub>Ck</sub> = CEC Kg. The relative affinity for K at the linear portion of the Q/I plots appears to be influenced by organic matter content and pH. Finally, The increase in organic matter content is shown to have a positive influence on the magnitude of highly affinity K<sup>+</sup> sites. *Soil Science Society of America journal*. July/Aug 1988. v. 52 (4). p. 1047-1054. illl. Includes references. (NAL Call No.: DNAL 56.9 S03).

1449

### **Effect of triazine residue on winter wheat following field corn.**

PNSB. Webb, F. Causey, M. College Park, Md. : The Society. *Proceedings of the annual meeting - Northeastern Weed Science Society*. 1990. v. 44. 78-79. (NAL Call No.: DNAL 79.9 N814).

1450

### **The effects of no-till and moldboard plow tillage on the movement of nitrates and pesticides through the Vadose Zone.**

PNDAAZ. Bischoff, J. Bender, A.; Carlson, C. Grand Forks, N.D. : The Academy. *Proceedings of the North Dakota Academy of Science*. Apr 1990. v. 44. p. 42. Includes references. (NAL Call No.: DNAL 500 N813).

1451

### **Effects of strip intercropping and no-tillage on some pest and beneficial invertebrates of corn in Ohio.**

EVETEX. Tonhasca, A. Jr. Stinner, B.R. Lanham, Md. : Entomological Society of America. We tested two agronomic practices that are likely to increase plant and structural diversity, no-tillage and strip intercropping, for effects on corn invertebrate fauna. Some of the most common herbivores and natural enemies were sampled by direct counts and damage estimation from 1988 through 1990 on monoculture corn and strips of corn alternated with soybean, under no-tillage and conventional tillage. Among soil pests, cut-worms (mostly the black cutworm, *Agrotis ipsilon* (Hufnagel)); armyworm, *Pseudaletia unipuncta* (Haworth); and slugs (Gastropoda) were more abundant in no-tillage plots, although only slugs caused severe damage. The western corn rootworm, *Diabrotica virgifera virgifera* LeConte, and the European corn borer, *Ostrinia nubitalis* (Hubner), were generally more abundant in conventional tillage plots. Despite crop rotation, the strip-intercropping system (four rows of each crop) was less effective in reducing western corn rootworm infestation, especially in conventional tillage plots. In 1990 only, ladybugs (mostly *Coleomegilla maculata* (DeGeer)) were more abundant in conventional tillage plots, whereas tarnished plant bugs, *Lytus lineolaris* (Palisot de Beauvois), were more abundant in no-tillage plots. Japanese beetle, *Popillia japonica* Newman; stink bugs, *Acrosternum hilare* (Say) and *Euschistus serous* (Say); and spiders (Aranea) were not significantly affected by treatments. *Environmental entomology*. Oct 1991. v. 20 (5). p. 1251-1258. Includes references. (NAL Call No.: DNAL QL461.E532).

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1452

**Effects of tillage, nitrogen management, and interseeding hairy vetch on continuous corn /by Randall E. Brown.**

Brown, Randall E. 1990. Thesis (M.S.)--University of Nebraska-Lincoln, 1990. 99 leaves : ill. ; 28 cm. Includes bibliographical references. (NAL Call No.: NBU LD3656 1990 B7687).

1453

**Effects of tillage on the efficacy and persistence of clomazone in soybean (*Glycine max*).**

WEESA6. Mills, J.A. Witt, W.W.; Barrett, M. Champaign, Ill. : Weed Science Society of America. Experiments were conducted in 1985 to 1987 to evaluate the effects of conventional and no-tillage systems on the weed control provided by clomazone applied pre-emergence in soybeans. The persistence of clomazone in soil of the two tillage systems was also determined. Increasing the clomazone rate from 0.8 to 1.4 kg/ha did not increase weed control. Clomazone controlled 80% or more of jimsonweed, velvetleaf, and giant foxtail. Common cocklebur control ranged from about 50 to 70% in no-till and from 80 to 90% in conventional tillage. Generally, soybean pods/plant and yields were lower from clomazone treatments than from handweeded treatments due to inadequate common cocklebur control. Over 40% of the clomazone applied did not reach the soil surface; it was either intercepted by wheat straw, volatilized, or both. Clomazone persisted longer in conventional tillage than in no-tillage in 1985. However, in 1986, clomazone was equally persistent in the two tillage systems. The half-life of clomazone was 34 and 6 days in 1985 in conventional and no-tillage, respectively, and in 1986, 18 and 16 days in conventional and no-tillage, respectively. Significant clomazone concentrations were not found below 10 cm in the soil profile. Corn planted without tillage (no-till) approximately 1 yr after clomazone application was not injured and yields were not reduced due to prior clomazone use. Weed science. Mar 1989. v. 37 (2). p. 217-222. Includes references. (NAL Call No.: DNAL 79.8 W41).

1454

**Effects of tillage with different crop residues on runoff and soil loss.**

TAAEA. McGregor, K.C. Mutchler, C.K.; Romkens, M.J.M. St. Joseph, Mich. : American Society of Agricultural Engineers. Simulated rainfall at a rate of 64 mm/h was applied to 3.4 X 10.7-m plots during 60-min initial, 30-min wet, and 30-min very wet runs. Treatments included tillage of two diskings on plots with corn residue, wheat residue, or no crop residue. Soil losses, adjusted to a 4% slope, from three replications of corn, fallow, and wheat plots averaged 4.88, 8.07, and 0.77 t/ha, respectively, during the initial 60-min runs; 2.73, 3.95, and 0.45 t/ha, respectively, during

the 30-min wet runs; and 2.91, 4.63, and 0.51 t/ha, respectively, during the 30-min very wet runs. Total soil loss from the two hours of rainfall averaged 10.52, 16.65, and 1.73 t/ha for corn, fallow, and wheat, respectively. Extremely low soil losses from the wheat plots compared to corn and fallow plots occurred because two diskings were sufficient to incorporate corn residues but left substantial amounts of wheat residues on the surface. Effects of surface cover were removed by using mulch factor adjustments for average surface cover of 15, 79, and 0% for corn, wheat, and fallow plots, respectively. This resulted in very similar values for adjusted soil losses for all treatments. Results indicate that soil erosion benefits credited to incorporation of crop residues are not merited for recently incorporated residues. Transactions of the ASAE. Sept/Oct 1990. v. 33 (5). p. 1551-1556. Includes references. (NAL Call No.: DNAL 290.9 AM32T).

1455

**Emergence of the western and northern corn rootworms (Coleoptera: Chrysomelidae) from four tillage systems.**

JEENAI. Gray, M.E. Tollefson, J.J. College Park, Md. : Entomological Society of America. Emergence of the western corn rootworm (WCR), *Diabrotica virgifera virgifera* LeConte, and northern corn rootworm (NCR), *D. barberi* Smith and Lawrence, was evaluated in four tillage systems near Ames, Iowa, from 1983 through 1985. Linear regression equations ( $y = a + bx$ ) and coefficients of determination ( $R^2$ ) are presented that describe cumulative emergence ( $y$ ) (profit scale) on Julian date ( $x$ ) for both species in each tillage system. Initial emergence generally was delayed in conservation tillage treatments for the WCR. The rate of WCR emergence in these tillage systems was greater, however, than in more conventional practices. Because of increased rates of WCR emergence from conservation tillage practices, cumulative beetle emergence by mid-August through early September is comparable among tillage treatments despite delayed emergence associated with conservation practices. Emergence of NCR was less affected by tillage. Journal of economic entomology. Oct 1988. v. 81 (5). p. 1398-1403. Includes references. (NAL Call No.: DNAL 421 J822).

1456

**Evaluation of soil loss after 100 years of soil and crop management.**

AGUOAT. Gantzer, C.J. Anderson, S.H.; Thompson, A.L.; Brown, J.R. Madison, Wis. : American Society of Agronomy. Sanborn Field, at the University of Missouri-Columbia was established in 1888 and is the oldest agricultural experiment field west of the Mississippi River. It provides an excellent opportunity to document how long-term crop rotations, and soil management influence soil erosion. Analyses of topsoil thickness are presented to describe soil remaining after 100 yr of cropping in

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plots planted to continuous corn (*Zea mays L.*), to continuous timothy (*Phleum pratense L.*). and to a 6-yr rotation cropped sequentially to corn, oat (*Avena sativa L.*), wheat (*Triticum aestivum*), clover (*Trifolium pratense*), timothy, and timothy. Topsoil thickness was significantly less for the continuous corn than the 6-yr rotation or timothy plots after 100 yr of cropping. Corn plots had only about 44%, and the rotation plots had only about 70% as much topsoil as did the timothy plots. The amount of clay in the plow layer was significantly higher in the corn plots compared to either the rotation or timothy plots suggesting that mixing of clay subsoil within the plow layer occurred in corn plots. Agronomy journal. Paper presented at the Symposium on Long-Term Field Research, October 17-18, 1989. Jan/Feb 1991. v. 83 (1). p. 74-77. Includes references. (NAL Call No.: DNAL 4 AM34P).

reduced when small grains were seeded with annual legumes. Results from these studies show that winter annual legumes can reduce N costs while providing better soil protection during winter months. Agronomy journal. Jan/Feb 1990. v. 82 (1). p. 117-124. Includes references. (NAL Call No.: DNAL 4 AM34P).

1457

**Fall armyworm (Lepidoptera: Noctuidae) infestations in no-tillage cropping systems.** FETMA. A11, J.N. Gainesville, Fla. : Florida Entomological Society. Florida entomologist. Paper presented at the "Fall Armyworm Symposium", 1988. Sept 1988. v. 71 (3). p. 268-272. Includes references. (NAL Call No.: DNAL 420 F662).

1458

**Fall-seeded legume cover crops for no-tillage corn in the humid East.** AGJOAT. Holderbaum, J.F. Decker, A.M.; Meisinger, J.J.; Mulford, F.R.; Vough, L.R. Madison, Wis. : American Society of Agronomy. No-tillage systems utilizing winter cover crops can reduce erosion and leaching losses. Fall-seeded legumes can also supply significant amounts of N to subsequent corn (*Zea mays L.*) crops. The suitability of 14 fall-seeded legumes, three small grains and four legume/grass mixtures was evaluated for winter covers from 1982 through 1985 on Matapeake silt loam (fine-loamy, mixed, mesic, Typic Hapludult) and Mattapex silt (fine-silty, mixed mesic, Aquaflic Normudult) Coastal Plain soils as well as Delanco silt loam and Chester silt loam (fine-loamy, mixed, mesic, Aquic Hapludult) Piedmont soils. Hairy vetch (*Vicia villosa* Roth), crimson clover (*Trifolium incarnatum* L.) and Austrian winter peas (*Pisum sativum* (L.) Poir. were the most promising cover crops. Fall growth and early soil coverage was highest with crimson and lowest with vetch which had higher winter survival and spring growth. Peas and, to a lesser extent, crimson clover stands were damaged in some years by *Sclerotinia trifoliorum* Eriks. In some years top growth of vetch contained up to 350 kg N/ha. While N concentration varied among species, total N production was determined more by dry matter yield. Legume cover crops had a greater influence on corn grain yields on the heavier textured soils and longer growing season of the Coastal Plain. In 1985, N contribution to the subsequent corn crop was

1459

**Financial projections for a case Illinois grain farm under three tillage scenarios.** Koenigstein, K.W. Hornbaker, R.H. Urbana, Ill. : The Service. Farm economics facts and opinions - University of Illinois, Department of Agricultural Economics, Cooperative Extension Service. Oct 1990. (90-18). 5 p. (NAL Call No.: DNAL 281.8 F2226).

1460

**First-generation European corn borer (Lepidoptera: Pyralidae) response to three conservation tillage systems in Minnesota.** JEENAI. Andow, D.A. Ostlie, K.R. Lanham, Md. : Entomological Society of America. Plant injury and densities of mature larvae by first-generation *Ostrinia nubilalis* (Hubner), European corn borer, were examined in chisel-plow, ridge-tillage, and no-tillage maize, *Zea mays* (L.), in southeastern Minnesota during 1985-1987. Tillage plots were split with and without terbufos application and with and without *Bacillus thuringiensis*-permethrin application in all combinations. Chisel-plow suffered greater plant injury than ridge-tillage or no-tillage, probably because oviposition was greater in chisel-plow. Ovipositing females were not responding primarily to plant height or developmental stage. Soil surface temperatures were higher in chisel-plow during the early evening when oviposition occurred, and we suggest microclimate influenced female oviposition. Larval density was highest in chisel-plow maize that received terbufos. We concluded that the risk of yield loss to first-generation *O. nubilalis* in ridge-tillage and no-tillage maize did not exceed the risk of yield loss in chisel-plow maize. Journal of economic entomology. Dec 1990. v. 83 (6). p. 2455-2461. Includes references. (NAL Call No.: DNAL 421 J822).

1461

**Good soil eases drought worries.** Kendall, D. Emmaus, Pa. : Regenerative Agriculture Association. The New farm. Nov/Dec 1988. v. 10 (7). p. 44-47. ill. (NAL Call No.: DNAL S1.N32).

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1462

### Harvest management of a crimson clover cover for no-tillage corn production.

AGJOAT. Holderbaum, J.F. Decker, A.M.; Meisinger, J.J.; Mulford, F.R.; Vough, L.R. Madison, Wis. : American Society of Agronomy. Legume cover crops are valuable N sources for no-tillage corn (*Zea mays* L.). However, little research has been done in assessing the management options for legume cover crops. Field studies were conducted on a Coastal Plain Matapeake silt loam soil (fine-silty, mixed, mesic Typic Hapludult) from 1983 through 1986 to determine the effects of various harvest management schedules on total N contribution of legume cover crops, subsequent corn grain and silage yields, and total forage (combined cover crop and corn herbage) production. A crimson clover (*Trifolium incarnatum* L.) cover crop was subjected to no harvest; spring silage harvest with clippings removed (spring silage); and simulated pasture harvests with clippings from multiple harvests removed (pasture removed) or returned (pasture returned). A no-cover control treatment was also included. No-tillage corn was grown in the cover crop residues and two fertilizer N (FN) rates (0 and 90 kg ha<sup>-1</sup>) were applied in a split-block design to each harvest management treatment. Averaged over 3 yr, multiple harvests of the cover crop vs. a spring silage harvest resulted in lower cover crop herbage yields (3.0 vs. 4.7 Mg ha<sup>-1</sup>) and total N content (114 vs. 146 kg N ha<sup>-1</sup>) for the multiple harvests. Corn grain and silage yields and corn N uptake were consistently higher following crimson clover cover than for no cover, regardless of harvest management, and were generally higher when the cover was left in place than following removal of the cover. There were FN responses regardless of harvest management treatment. The reduction in corn silage yield when the cover crop was harvested and removed was less than the cover crop herbage dry matter yield, resulting in greater total forage production when the cover crop was harvested as forage. Results suggest that harvest management options of a crimson clover cover crop offer flexibility in either optimizing subsequent corn grain yields or total forage production for no-tillage cropping. Agronomy journal. Sept/Oct 1990. v. 82 (5). p. 918-923. Includes references. (NAL Call No.: DNAL 4 AM34P).

1463

### Impacts of cropping intensity on carbon and nitrogen mineralization under no-till dryland agroecosystems.

AGJOAT. Wood, C.W. Westfall, D.G.; Peterson, G.A.; Burke, I.C. Madison, Wis. : American Society of Agronomy. Imposing no-till and lower fallow frequency on soils previously managed under tilled and frequent fallow systems may alter soil organic C and N concentrations and activity (potential mineralization). This study was conducted to determine the effect of cropping intensity (number of crops/unit time) on surface soil (0-5 cm) C and N activity after 3.5 yr of no-till management. The effect was examined across three soil catenas in the West

Central Great Plains that were previously managed under tilled and alternate crop-fallow systems for >50 yr. Production systems included the less intensive wheat (*Triticum aestivum* L.)-fallow (WF), and the more intensive wheat-corn (*Zea mays* L.)-millet (*Panicum miliaceum* L.)-fallow (WCMF). After 3.5 yr of no-till, potential C and N mineralization, C turnover, and relative N mineralization were 61, 39, 36, and 43% greater under WCMF than WF, respectively. Footslope soils had greater potential C and N mineralization than summit or backslope soils, but lower C turnover and relative N mineralization, which was probably due to long-term accumulation of recalcitrant C and N compounds. Differences in potential soil C and N activity between cropping systems were due to greater surface organic C concentrations under WCMF (mean = 10.88 g kg<sup>-1</sup>) than WF (mean = 9.60 g kg<sup>-1</sup>), which were related to cumulative plant residue additions over the 3.5-yr-study period (mean = 9.01 and 7.04 Mg ha<sup>-1</sup> for WCMF and WF, respectively). It appears that potentially active surface soil organic C and N are very sensitive to change in cultural practices, and are increased by greater cropping intensity under no-till management. Agronomy journal. Nov/Dec 1990. v. 82 (6). p. 1115-1120. Includes references. (NAL Call No.: DNAL 4 AM34P).

1464

### Influence of cover crop and wheel traffic on soil physical properties in continuous no-till corn.

SSSJJD4. Waggoner, M.G. Denton, H.P. Madison, Wis. : The Society. Conservation tillage systems utilizing winter annual cover crops represent a different soil physical environment compared to conventional tillage systems. A field experiment was conducted for 3 yr on a Goldsboro fine sandy loam (fine-loamy, siliceous, thermic Aquic Paleudults) in the North Carolina Coastal Plain to assess effects of cover crop type and row position on soil physical properties under no-tillage corn (*Zea mays* L.) management. Bulk density, soil porosity, and hydraulic conductivity (Ksat) were measured in fallow, winter wheat (*Triticum aestivum* L.), and hairy vetch (*Vicia villosa* Roth.) systems with respect to three row positions (trafficked, untrafficked, and plant row). All traffic was controlled such that each corn row was bordered by a trafficked and untrafficked interrow. In general, soil physical properties were unaffected by cover crop type but strongly influenced by position. Bulk density was significantly higher in the trafficked vs. untrafficked position (1.74 vs. 1.52 Mg m<sup>-3</sup>) after 3 yr and tended to increase with time in the trafficked interrow. Associated with higher bulk density values in the trafficked interrow were significantly lower values for soil porosity and Ksat. Total porosity in the trafficked position, averaged over cover crop type and 3 yr, decreased 21% below that of the untrafficked position. After 3 yr, Ksat was 0.019 and 0.002 mm s<sup>-1</sup> in untrafficked and trafficked interrows, respectively. These results suggest that controlled traffic patterns may be an important

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component in the management of continuous, conservation tillage systems. Soil Science Society of America journal. July/Aug 1989. v. 53 (4). p. 1206-1210. Includes references. (NAL Call No.: DNAL 56.9 S03).

1465

**Influence of cover cropping and no-tillage practices on community composition of soil arthropods in a North Carolina agroecosystem.** EVETEX. House, G.J. Rosario Alzugaray, M. del. Lanham, Md. : Entomological Society of America. Winter legume and grain cover crops preceding corn, *Zea mays* L., grown using conventional and no-tillage methods were investigated for their effect on population dynamics and community structure of soil arthropods. Hairy vetch, *Vicia villosa* Roth, supported higher below-ground arthropod population densities and a more taxonomically diverse fauna than crimson clover, *Trifolium incarnatum* L., or wheat, *Triticum aestivum* L. Pest and beneficial soil arthropods were most abundant in no-tillage corn preceded by hairy vetch. Diversity of soil arthropod species was higher under no-tillage than conventional tillage. Divergences in community structure of soil arthropods among cover crop species, evident early in the season, dissipated by midseason. Arthropod predators were more numerous in no-tillage than conventional tillage systems regardless of previous cover crops. Although no-tillage practices promoted a more trophically balanced soil arthropod community than conventional tillage during early and mid season, in 1987 seedling corn plants in no-tillage vetch treatments sustained significantly higher ( $P$  less than 0.05) damage from the southern corn rootworm, *Diabrotica undecimpunctata howardi* Barber, than in other treatments. Tillage system preference was shown by herbivores: Seedcorn maggot, *Delia platura* (Meigen), occurred in large numbers in conventional tillage, and southern corn rootworm populations were high in no-tillage, especially following legume cover crops. Environmental entomology. Apr 1989. v. 18 (2). p. 302-307. Includes references. (NAL Call No.: DNAL QL461.E532).

1466

**The influence of herbicide formulation on weed control in four tillage systems.** WEESA6. Johnson, M.D. Wyse, D.L.; Lueschen, W.E. Champaign, Ill. : Weed Science Society of America. The objectives of this research were to compare the weed control efficacy of liquid, granular, and microencapsulated formulations of preemergence herbicides in moldboard plow, chisel plow, ridge tillage, and no-tillage corn and soybean production systems, and to determine whether herbicide formulation can influence herbicide interception and retention on surface corn residue. Common lambsquarters populations were threefold higher in corn than in soybeans. A mixed population of giant foxtail and green foxtail was highest in the chisel plow and lowest in the ridge tillage system as were total weed numbers. Percent weed

control was not influenced by tillage when considered across all herbicide treatments. Weed control was not influenced by herbicide formulation in the moldboard plow, chisel plow, or ridge tillage systems, but granular herbicide applications provided better weed control than liquid applications in the no-tillage system and across various rates of corn residue in an experiment with no tillage variables. Two- to threefold less granular-applied herbicide was intercepted by surface corn residue at the time of application compared to liquid-applied herbicide. Increasing amounts of postapplication rainfall decreased the difference among formulations with regard to both total soil reception of the herbicide and resultant weed control. There was no consistent advantage for the microencapsulated formulation over the other herbicide formulations. Surface corn residue controlled many weeds without the aid of a herbicide and actually contributed to overall weed control even where herbicides were applied. This suggests that the binding of preemergence herbicides on surface crop residue may not be the cause of weed control failures in reduced-tillage systems as is often assumed to be the case. Weed science. Mar 1989. v. 37 (2). p. 239-249. Includes references. (NAL Call No.: DNAL 79.8 W41).

1467

**Influence of nitrogen fertilization, tillage and residue management on a soil nitrogen mineralization index.**

CSOSA2. Clay, D.E. Clapp, C.E.; Molina, J.A.E.; Dowdy, R.H. New York, N.Y. : Marcel Dekker. Communications in soil science and plant analysis. 1990. v. 21 (3/4). p. 323-335. Includes references. (NAL Call No.: DNAL S590.C63).

1468

**Influence of tillage systems on annual weed densities and control in solid-seeded soybean (*Glycine max*).**

WEESA6. Buhler, D.D. Oplinger, E.S. Champaign, Ill. : Weed Science Society of America. Field research was conducted at Arlington, WI, and Janesville, WI, in 1986 and 1987 to evaluate the effect of conventional-tillage, chisel plow, and no-till systems on the density and control of annual weed species in solid-seeded soybean. Common lambsquarters densities were not greatly influenced by tillage systems, but redroot pigweed densities were generally highest in the chisel plow system. Conventional tillage always had greater velvetleaf densities than no-till and no-till always had greater giant foxtail densities than conventional tillage. Giant foxtail and redroot pigweed became more difficult to control when tillage was reduced, while velvetleaf became less of a problem. This response was not observed with all herbicide treatments evaluated and several herbicide treatments provided excellent weed control. Soybean yield was not affected by tillage systems under weed-free conditions and

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differences in soybean yield appeared to be due to differences in weed control. Weed science. Mar 1990. v. 38 (2). p. 158-165. Includes references. (NAL Call No.: DNAL 79.8 W41).

1469

Influence of tillage systems on egg populations of western and northern corn rootworms (Coleoptera: Chrysomelidae).

JKESA. Gray, M.E. Tollefson, J.J. Lawrence, Kan. : The Society. Journal of the Kansas Entomological Society. Apr 1988. v. 61 (2). p. 186-194. Includes references. (NAL Call No.: DNAL 420 K13).

1470

Influence of tillage systems on giant foxtail, *Setaria faberi*, and velvetleaf, *Abutilon theophrasti*, density and control in corn, *Zea mays*.

WEESA6. Buhler, D.D. Daniel, T.C. Champaign, Ill. : Weed Science Society of America. Giant foxtail density in corn was greater under no-till and chisel plow tillage systems than conventional or till plant. Giant foxtail density in no-till was 1400 shoots/m<sup>2</sup> 56 days after corn planting compared to 170 under conventional tillage. Velvetleaf density was greater under conventional tillage than all other tillage systems. Velvetleaf density was 120 plants/m<sup>2</sup> 56 days after corn planting under conventional tillage compared to 20 in no-till. Control of giant foxtail was often less under no-till or chisel plow conditions than conventional or till plant with the same herbicide treatment. Giant foxtail control with metolachlor treatments was affected less by tillage than similar treatments containing alachlor. Velvetleaf control was less with conventional tillage than other tillage systems when less than 1.7 kg/ha of atrazine was applied. Corn injury was not influenced by tillage systems. Corn yield was not affected by tillage systems under weed-free conditions. Several herbicide treatments resulted in corn yield similar to the weed-free under conventional tillage, but no herbicide treatment produced corn yield similar to the weed-free control under no-till conditions. Weed science. Sept 1988. v. 36 (5). p. 642-647. Includes references. (NAL Call No.: DNAL 79.8 W41).

1471

Intercropping corn in perennial cool-season grass on irrigated sandy soil.

JPRAEN. Klocke, N.L. Nichols, J.T.; Grabouski, P.H.; Todd, R. Madison, Wis. : American Society of Agronomy. Journal of production agriculture. Jan/Mar 1989. v. 2 (1). p. 42-46. Includes references. (NAL Call No.: DNAL S539.5.J68).

1472

Introduction to ridge-tillage for corn and soybeans.

Griffith, D.R. Parsons, S.D.; Mengel, D.B.; Mannerling, J.V.; Childs, D. West Lafayette, Ind. : The Service. Publication I.D. - Cooperative Extension Service, Purdue University. Nov 1989. (180). 8 p. (NAL Call No.: DNAL 275.29 IN2ID).

1473

Long-term conventional and no-tillage effects on selected soil physical properties.

SSSJ4. Hill, R.L. Madison, Wis. : The Society. Soil management systems can affect soil physical properties and, thus, have a direct bearing on crop performance. This study determined the effects of continuous long-term conventional and no-tillage management on selected soil physical properties and compared observed yield differences between these tillage systems with soil physical properties. Three Maryland locations, each having randomized complete-block designs with three replications of continuous corn (*Zea mays L.*) under conventional and no-tillage management, were used. Sites 1 and 2 were in their 12th yr of tillage and Site 3 was in its 11th yr. Soils at all three sites were silt loams (fine-loamy, mixed, Aquic Hapludults). Tillage affected bulk density at the 0.05 level at Site 1 and the 0.10 level at Site 2. No-tilled soils generally had higher bulk density at all soil depths for Sites 1 and 2. Tillage affected soil strength at Sites 1 and 2, but not at Site 3. Soil strength for no-filled soils was consistently greater than for conventionally tilled soils. Conventionally tilled soils had greater pore volume in pores with radii > 15 micrometers at Sites 1 and 2, and, therefore, should drain more readily than no-tilled soils. More importantly, the amount of pore space available for the storage of plant-available water was greater for conventionally-tilled soils at Sites 1 and 2. Although soil physical properties within the Ap horizon are not adequate to account for differences in corn yield response, tillage differences in soil physical properties were found for the soils at Sites 1 and 2, which had previously shown tillage yield differences. Soil Science Society of America journal. Jan/Feb 1990. v. 54 (1). p. 161-166. Includes references. (NAL Call No.: DNAL 56.9 S03).

1474

Long-term tillage effects of seed banks in three Ohio soils.

WEESA6. Cardina, J. Regnier, E.; Harrison, K. Champaign, Ill. : Weed Science Society of America. Soils from long-term tillage plots at three locations in Ohio were sampled to determine composition and size of weed seed banks following 25 yr of continuous no-tillage, minimum-tillage, or conventional-tillage corn production. The same herbicide was applied across tillage treatments within each year and

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an untreated permanent grass sod was sampled for comparison. Seed numbers to a 15-cm depth were highest in the no-tillage treatment in the Crosby silt loam (77 800 m<sup>-2</sup>) and Wooster silt loam (8400 m<sup>-2</sup>) soils and in the grass sod (7400 m<sup>-2</sup>) in a Hoytville silty clay loam soil. Lowest seed numbers were found in conventional-tillage plots in the Wooster soil (400 m<sup>-2</sup>) and in minimum-tillage plots in the Crosby (2200 m<sup>-2</sup>) and Hoytville (400 m<sup>-2</sup>) soils. Concentration of seeds decreased with depth but the effect of tillage on seed depth was not consistent among soil types. Number of weed species was highest in permanent grass sod (10 to 18) and decreased as soil disturbance increased; weed populations were lowest in conventional tillage in the Hoytville soil. Common lambsquarters, pigweeds, and fall panicum were the most commonly found seeds in all soils. Diversity indices indicated that increased soil disturbance resulted in a decrease in species diversity. Weed populations the summer following soil sampling included common lambsquarters, pigweeds, fall panicum, and several species not detected in the seed bank. Weed science. Apr/June 1991. v. 39 (2). p. 186-194. Includes references. (NAL Call No.: DNAL 79.8 W41).

1475

### Long-term wheel traffic effects on soil physical properties under different tillage systems.

SSJD4. Hill, R.L. Meza-Montalvo, M. Madison, Wis. : The Society. This study determined the effects of long-term vehicular wheel traffic on soil physical properties for a Mattapex silt loam (fine-loamy, mixed, mesic Aquic Hapludult) under different tillage systems. The site utilized a randomized complete-block design with four replications of continuous-corn (*Zea mays L.*) plots under no-till and conventional till, both of which had controlled wheel traffic for 14 yr. Wheel-traffic loads during the 14-yr period had been confined to axle loads of < 4.5 Mg. Wheel traffic generally increased bulk density and soil strength. Wheel traffic resulted in over a 50% increase in soil strength when compared with non-wheel-tracked areas. The relative soil strength increase from wheel traffic was less for no-tilled soil than conventionally tilled soil, although the mean increase (approximately 40 kPa) was the same for both tillage systems. Wheel-traffic effects on bulk density and soil strength decreased with depth and were largely dissipated by the 30-cm depth. The presence of wheel traffic in the conventionally tilled interrows significantly reduced the pore volume of pores > 15 microm in the upper 17.8-cm portion of the soil, but did not cause similar reductions in the no-tilled interrows. Conventionally tilled soil exhibited more pore space in the 15- to 0.1-microm radius range that should retain plant-available water. Wheel traffic did not exhibit statistically significant effects for the 15- to 0.1-microm range. Neither tillage system nor wheel traffic adversely changed soil physical properties so much that detrimental conditions for plant growth would be encountered. Reasonable doubt exists regarding

the necessity to subsoil this soil on a regular basis to alleviate the effects of wheel traffic or continuous no-tillage management as long as small-scale farm equipment has been used. Soil Science Society of America journal. May/June 1990. v. 54 (3). p. 865-870. Includes references. (NAL Call No.: DNAL 56.9 S03).

1476

### A method for observing below-ground pest-predator interactions in corn agroecosystems.

JESCEP. Brust, G.E. Tifton, Ga. : Georgia Entomological Society. Journal of entomological science. Jan 1991. v. 26 (1). p. 1-8. ill. Includes references. (NAL Call No.: DNAL QL461.G4).

1477

### Minimum tillage corn (*Zea mays*) and sorghum (*Sorghum bicolor*) silage production in southeast Louisiana.

LAXBA. Morris, D.R. Joost, R.E.; Friesner, D.L.; Allen, M.; Bracy, R.; Jodari, F.; Parish, R.; Mason, L.F. Baton Rouge, La. : The Station. Bulletin - Louisiana Agricultural Experiment Station. Nov 1989. (817). 31 p. Includes references. (NAL Call No.: DNAL 100 L93 (1)).

1478

### Movement of atrazine by water from application sites in conventional and no-tillage corn production.

Foy, C.L. Hiranpradit, H. Blacksburg : Virginia Water Resources Research Center, VPI and State University, 1989. Pesticides in terrestrial and aquatic environments : proceedings of a national research conference, May 11-12, 1989 / edited by Diana L. Weigmann. p. 355-377. ill. Includes references. (NAL Call No.: DNAL QH545.P4P4844).

1479

### Nitrogen balance and biomass production of newly established no-till dryland agroecosystems.

AGJOAT. Wood, C.W. Peterson, G.A.; Westfall, D.G.; Cole, C.V.; Willis, W.O. Madison, Wis. : American Society of Agronomy. Soil-crop management affects the soil-N balance and, thus, has a direct bearing on soil productivity. This study determined the effects of cropping intensity (crops/time) under no-till and grassland establishment on aboveground biomass production and the system-N balance after 4 yr (1985-1989). The effects were examined across toposequences in the West Central Great Plains that had been tilled and frequently fallowed for > 50 yr. Production systems included wheat (*Triticum aestivum L.*)--fallow (WF), wheat-corn (*Zea mays L.*) or sorghum (*Sorghum vulgare L.*)--millet (*Panicum*

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miliaceum L.)--fallow (WCMFW), and perennial grass (CG). Intense agronomic systems (WCMF) had greater aboveground production, greater N uptake, and greater percent plant residue retention than WF. Continuous grass systems had less aboveground production and N uptake but greater percent plant residue retention than agronomic systems. Soil-profile NO<sub>3</sub>-N was lower under WCMF systems than WF systems, but organic N showed the opposite trend implying that more intense systems are at less risk for NO<sub>3</sub>-N leaching, and have greater potential for replenishment of soil-organic N via enhanced immobilization. Aboveground biomass production and plant residue production increased downslope, but slope position had little effect on plant-N uptake, plant residue retention, or soil-N dynamics. Imposing no-till and perennial grassland systems created a N-balance disequilibrium, but more time will be required to ascertain the trajectory of N loss or gain due to establishment of no-till or grassland management on these soils. *Agronomy journal*. May/June 1991. v. 83 (3). p. 519-526. Includes references. (NAL Call No.: DNAL 4 AM34P).

1480

### Nitrogen fertilization in ridge-till corn to reduce nitrate leaching and increase nitrogen use efficiency.

Cruse, R.M., Kohler, K.A., Ames, Iowa : The Service. PM - Iowa State University, Cooperative Extension Service. In the series analytic: Integrated Farm Management Demonstration Program. 1990 Progress Report. Jan 1991. (1417). p. 23-24. (NAL Call No.: DNAL 275.29 I09PA).

1481

### Nitrogen fertilizer recovery by corn in monoculture and rotation systems.

AGJOAT. Varvel, G.E., Peterson, T.A. Madison, Wis. : American Society of Agronomy. Crop rotations including legumes have increased in importance because of their potential to reduce large inorganic N fertilizer needs for corn (*Zea mays* L.) and other crops. This study was conducted to determine N fertilizer recovery by corn in monoculture and rotational systems. Corn was grown under rainfed conditions on a Sharpsburg silty clay loam (fine, montmorillonitic, mesic, Typic Argiudoll) in four cropping systems: (i) continuous corn monoculture, (ii) a 2-yr soybean (*Glycine max* (L.) Merr.) -corn rotation, (iii) a 4-yr rotation of oat (*Avena sativa* L.) + clover 80% *Melilotus officinalis* (L.) and 20% *Trifolium pratense* -grain sorghum (*Sorghum bicolor* (L.) -soybean-corn, and (iv) a 4-yr rotation of soybean-grain sorghum-oat + clover-corn at Mead, NE. Broadcast applications of 15N-depleted NH<sub>4</sub>NO<sub>3</sub> were made at 90 and 180 kg N ha<sup>-1</sup> in 1985 and 1986 to evaluate N fertilizer recovery by corn in each cropping system using isotopic methods. Nitrogen recovery determined by isotopic methods was significantly higher for corn in rotation vs. corn in monoculture, averaging 58.6 vs. 52.3%

and 49.8 vs. 43.4% at the 90 and 180 kg N ha<sup>-1</sup> rates, respectively. In contrast, fertilizer N recovery estimated by the difference method was much greater in continuous corn vs. N recovery in corn following oat + clover in the 4-yr rotation. These differences indicated that N fertilizer applied to corn in each cropping system appeared to be entering different sizes and types of organic soil N pools, resulting in apparent differences in N immobilization. Our results demonstrate problems exist in estimating fertilizer N recovery with both methods (isotope or difference) and before accurate N recovery estimates by corn or any other crop can be made in complex soil and crop management systems, procedures must be developed to explicitly follow N fertilizer pathways (immobilization, denitrification, volatilization, leaching, etc.). Until that time, correct interpretations with either method. *Agronomy journal*. Sept/Oct 1990. v. 82 (5). p. 935-938. Includes references. (NAL Call No.: DNAL 4 AM34P).

1482

### Nitrogen source, rate, and application method for no-tillage corn.

SSJD4. Howard, D.D., Tyler, D.D. Madison, Wis. : The Society. Surface applying urea-containing N fertilizers may result in greater N losses by volatilization of NH<sub>3</sub> as urea hydrolyses than nonurea containing materials. The objective of this study was to evaluate the N efficiency of urea-ammonium nitrate (UAN), urea and urea-urea phosphate (UUP) at 56, 112, 168, and 224 kg ha<sup>-1</sup> N rates applied broadcast, surface banded, and injected for no-till corn (*Zea mays* L.). Yield, ear-leaf N concentration, and N uptake were used to estimate N availability. Broadcast ammonium nitrate (AN) and injected anhydrous ammonia (AA) were used as controls for evaluating N efficiency of urea-containing N sources and their application methods. The method of applying the urea-containing N sources has a significant effect on apparent N fertilizer availability. injecting UAN and urea resulted in significantly higher yield, leaf N concentration, and N uptake when compared with broadcast and surface band application methods. Surface banding UAN at 168 and 224 kg ha<sup>-1</sup> resulted in higher yields than urea or UUP. Yield, leaf N concentration and N uptake differences among the three urea-containing N sources were not observed when broadcast applied. Broadcasting AN at 168 and 224 kg ha<sup>-1</sup> resulted in higher yields than UAN, urea or UUP. Injecting the N sources resulted in higher yields when compared with broadcasting AN. *Soil Science Society of America journal*. Sept/Oct 1989. v. 53 (5). p. 1573-1577. Includes references. (NAL Call No.: DNAL 56.9 S03).

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1483

### No-till corn production in a living mulch system.

WETEE9. Echtenkamp, G.W. Moomaw, R.S. Champaign, Ill. : The Society. Weed technology : a journal of the Weed Science Society of America. Apr/June 1989. v. 3 (2). p. 261-266. Includes references. (NAL Call No.: DNAL SB610.W39).

1484

### Optimum time(s) of nitrogen application to improve nitrogen use efficiency and reduce leaching.

AMOS, F.B. Jr. Baker, J.L.; Timmons, D.R.; Kanwar, R.S. Ames, Iowa : The Service. PM - Iowa State University, Cooperative Extension Service. In the series analytic: Integrated Farm Management Demonstration Program. 1990 Progress Report. Jan 1991. (1417). p. 35-39. (NAL Call No.: DNAL 275.29 I09PA).

1485

### Planting depth and tillage interactions on corn emergence.

SSJD4. Gupta, S.C. Schneider, E.C.; Swan, J.B. Madison, Wis. : The Society. Surface crop residues lower soil temperatures delaying emergence of corn (*Zea mays L.*) under no-till tillage systems in the northern Corn Belt. This study evaluates the use of planting depth as a management tool to overcome the disadvantages of cool temperature under residue covered soils. Growth chamber experiments evaluated the effects of planting depths, ranges of soil temperatures, and soil matric potentials on corn emergence. The seeding medium was aggregates of Webster clay loam (fine-loamy, mixed, mesic Typic Haplaqueolls). Deep planting (75 mm) delayed emergence from 2.8 to 18 d as the soil temperatures decreased from ranges of 15 to 25 degrees C and 5 to 15 degrees C. Seed zone growing degree days (GDD) needed to achieve 75% emergence increased with an increase in planting depth and a decrease in soil matric potential. Relationships of corn emergence vs. seed zone GDD needed to achieve 75% corn emergence at various planting depths were tested in the field for three planting depths, three tillage and three surface residue conditions during 1984 and 1985. Predicted time to 75% corn emergence was within 2 d of the field-measured values for three planting depths, and seven tillage and surface residue conditions, over two seasons. Simulation studies were conducted to predict the effects of tillage, planting depth, and planting date on the probability of obtaining 75% corn emergence within 14 d of planting. Input data for simulation studies included 10 to 20 yr of daily maximum and minimum air temperatures from Morris, MN and Lexington, KY. Tillage treatments included moldboard plow, no surface residue, and no-till surface residues. Reducing the planting depth from 50 to 25 mm advanced the planting date from 2 d to several weeks, depending on the weather, soil matric

potential, and tillage-surface residue conditions. When soil water is nonlimiting, the effect of cooler temperatures on corn emergence under a no-till tillage system (with surface residues) can be c. Soil Science Society of America journal. July/Aug 1988. v. 52 (4). p. 1122-1127. Includes references. (NAL Call No.: DNAL 56.9 S03).

1486

Potential for using maize as a trap crop for the fall armyworm, *Spodoptera frugiperda* (Lepidoptera: Noctuidae), where sorghum and maize are intercropped on subsistence farms. FETMA. Castro, M. Pitre, H.; Meckenstock, D. Gainesville, Fla. : Florida Entomological Society. Florida entomologist. Paper presented at the "Fall Armyworm Symposium", 1988. Sept 1988. v. 71 (3). p. 273-278. Includes references. (NAL Call No.: DNAL 420 F662).

1487

Projected costs and returns--soybeans, corn, milo, wheat, wheat-soybean double crop, and rice-crawfish double crop, Southwest Louisiana, 1989.

McManus, B. Zacharias, T. Baton Rouge, La. : The Station. A.E.A. information series - Louisiana Agricultural Experiment Station. In the series analytic: Projected costs and returns and cash flows from major agricultural enterprises, Louisiana, 1989.~ Includes statistical data. Jan 1989. (70-76). p. C1-C79. (NAL Call No.: DNAL S67.E2).

1488

### Reduction of European corn borer (Lepidoptera: Pyralidae) damage by intercropping corn with soybean.

JEENAI. Martin, R.C. Arnason, J.T.; Lambert, J.D.H.; Isabelle, P.; Voldeng, H.D.; Smith, D.L. Lanham, Md. : Entomological Society of America. Corn, *Zea mays L.*, and soybean, *Glycine max (L.) Merrill*, were intercropped for silage in 1985 and 1986 at the Central Experimental Farm, Ottawa, to determine effects on yields and the percentage of European corn borer, *Ostrinia nubitalis* Hubner, infestation. A 2 x 2 x 3 factorial was analyzed with two corn hybrids (dwarf PAG 391134 and tall Coop S259), two corn cropping systems (monocropped and intercropped), and three nitrogen fertilizer levels (0, 60, and 120 kg N/ha). Intercropping significantly reduced European corn borer infestation in tall corn in 1985 and in both corn hybrids in 1986. Dwarf corn was infested significantly less than tall corn in both years and in both cropping systems. The commonly applied rate of 120 kg N/ha resulted in the highest European corn borer infestation. Yields and land equivalent ratios at 60 kg N/ha were as high as those at 120 kg N/ha, but European corn borer infestation was significantly less at 60 kg N/ha. Application of 0 kg N/ha resulted in the lowest yields and

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land equivalent ratios, but European corn borer infestation was not different from levels at 60 kg N/ha. Journal of economic entomology. Oct 1989. v. 82 (5). p. 1455-1459. Includes references. (NAL Call No.: DNAL 421 J822).

1489

"Relay-planting" from alfalfa to cotton, blackeyes or silage corn.  
WSWPA. Kempen, H.M. Muner, D.; Gonzalez, M.P. Reno, Nev. : The Society. Proceedings - Western Society of Weed Science. Meeting held March 12-14, 1991, Seattle Washington. 1991. b v. 44. p. 103-108. (NAL Call No.: DNAL 79.9 W52).

1490

**Reseeding potential of crimson clover as a cover crop for no-tillage corn.**  
AGJOAT. Myers, J.L. Waggoner, M.G. Madison, Wis. : American Society of Agronomy. Leguminous cover crops can provide biologically fixed N to a subsequent corn (*Zea mays L.*) crop as well as erosion control and moisture conserving mulch, but establishment is costly and often unsuccessful. A field experiment was conducted for 3 yr to determine the self-reseeding potential of crimson clover (*Trifolium incarnatum L.*) and its N contribution in a no-tillage corn production system. Four cover crop management treatments (fallow, annual-seeded, volunteer-reseeded, and volunteer strip-reseeded) were combined factorially with four fertilizer-N rates (0, 50, 100, or 150 kg ha<sup>-1</sup>) applied to the subsequent corn crop. The annual-seeded, volunteer-reseeded, and volunteer strip-reseeded clover treatments were desiccated at corn planting. Averaged over 3 yr, crimson clover dry matter was 2.6, 4.2, and 3.5 Mg ha<sup>-1</sup> for the annual-seeded, volunteer-reseeded, and strip-reseeded treatments, respectively. In 1988 and 1989, cover crop treatments produced mean corn grain yields of 6.0 and 6.1 Mg ha<sup>-1</sup> compared to fallow treatment yields of 3.4 and 4.0 Mg ha<sup>-1</sup>, respectively. This same pattern was reflected in the silage yields and total corn N uptake. Corn grain yields were unaffected by fertilizer-N rate in two out of 3 yr due to limited rainfall. Both self-reseeding treatments successfully reestablished each year and increased corn yields primarily by a mulching effect. Allowing crimson clover to mature before chemical desiccation or leaving strips between corn rows to produce seed appear to be effective methods of reseeding clover in a no-tillage corn silage production system. Agronomy journal. Nov/Dec 1991. v. 83 (6). p. 985-991. Includes references. (NAL Call No.: DNAL 4 AM34P).

1491

**Residual effects of CGA-131036 and chlorsulfuron on spring-sown rotational crops.**  
WEESA6. Friesen, G.H. Wall, D.A. Champaign, Ill. : Weed Science Society of America. Response of flax, canola, field pea, sunflower, field corn, lentils, and common buckwheat to soil residues of CGA-131036 and chlorsulfuron applied at 22 g ai ha<sup>-1</sup> was determined on two soil types at Morden, Manitoba. On a fine sandy loam with a pH of 7.4 and 4.5% organic matter, the length of time required before crops showed no phytotoxicity from CGA-131036 residues was: sunflower 4 yr; canola and common buckwheat 3 yr; flax 2 yr; field pea and field corn 1 yr. On a clay loam with a pH of 6.5 and 5.3% organic matter, the corresponding duration was: lentil, canola, and sunflower 3 yr; flax and field pea 1 yr. Chlorsulfuron residues persisted somewhat longer than CGA-131036 residues on the sandy loam but not on the clay loam. Weed science. Apr/June 1991. v. 39 (2). p. 280-283. Includes references. (NAL Call No.: DNAL 79.8 W41).

1492

**Residual effects of nitrogen fertilization and winter cover cropping on nitrogen availability.**  
SSJD4. McCracken, D.V. Corak, S.J.; Smith, M.S.; Frye, W.W.; Blevins, R.L. Madison, Wis. : The Society. Long-term management practices affect the reserve of mineralizable soil N, and so can influence the amount of supplemental N fertilizer required in crop production. This study was conducted to (i) evaluate the residual effects of long-term N fertilization and winter cover cropping on corn (*Zea mays L.*) N nutrition, and (ii) examine the ability of selected soil indices to detect management-induced differences in soil N availability. In 1986, N fertilizer and winter cover crops were eliminated from plots which, from 1976 through 1985, had received varying tillage treatments, N fertilizer additions, and either hairy vetch (*Vicia villosa Roth*), rye (*Secale cereale L.*), or no winter cover crop. A history of N fertilization increased corn yield and N uptake (by an average of 20.4 kg N/ha). A history of winter cover cropping with hairy vetch increased corn yield and N uptake (by an average of 28.0 kg N/ha). Rye cover cropping generally had small or inconsistent effects relative to no cover crop. Tillage generally had insignificant effects on corn yield and N uptake. Soil N availability indices were determined on surface samples (0-15 cm) taken 2 wk after corn planting. The anaerobic incubation provided a poor index of N availability. Total soil C and Kjeldahl N were affected by tillage, though not by cover crop or fertilization history, and were marginally correlated with crop response. The autoclave index was only slightly superior to total soil C and Kjeldahl N as a N-availability index. The soil NO<sub>3</sub>-N concentration was highly correlated with corn yield, and N uptake. Though this study was conducted for 1 yr at one site, results indicate that measurement of surface soil NO<sub>3</sub>-N made shortly after corn planting can provide a valid index of the effects of past

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crop and soil management practices on soil N availability to corn. Soil Science Society of America journal. Sept/Oct 1989. v. 53 (5). p. 1459-1464. Includes references. (NAL Call No.: DNAL 56.9 S03).

1493

### Response of rotational crops to soybean herbicides.

SWSBPE. Monks, C.D. Banks, P.A. Raleigh, N.C. : The Society . Proceedings - Southern Weed Science Society. Paper presented at the "Meeting on Environmental Legislation and its Effects on Weed Science," Jan 18/20, 1988, Tulsa, Oklahoma. 1988. v. 41. p. 47. (NAL Call No.: DNAL 79.9 S08 (P)).

1494

### Response of weed to tillage and cover crop residue.

WEESA6. Teasdale, J.R. Beste, C.E.; Potts, W.E. Champaign, Ill. : Weed Science Society of America. Total weed density increased after 1 yr of no-tillage and after 2 yr of conventional tillage in a 4-yr experiment with repeated assignment of the same treatment to the same plots. Large crabgrass, goosegrass, and carpetweed densities were higher in the no-tillage compared with the conventional-tillage treatment in at least 1 yr whereas common lambsquarters density was greater in the conventional-tillage treatment the last year of the experiment. Within the no-tillage treatment, rye or hairy vetch residue reduced total weed density an average of 78% compared to the treatment without cover crop when cover crop biomass exceeded 300 g m<sup>-2</sup> and when residue covered more than 90% of the soil. Goosegrass, stinkgrass, and carpetweed densities were reduced by cover crop residue in at least 1 yr whereas large crabgrass was unaffected. Common lambsquarters density increased where rye was grown as a cover crop prior to conventional tillage. Despite differences in weed density among treatments, weed biomass was equivalent in all. Weed science. Apr/June 1991. v. 39 (2). p. 195-199. Includes references. (NAL Call No.: DNAL 79.8 W4i).

1495

### Risk and sustainable agriculture: a target-MOTAD analysis of the 92-year "old rotation".

Novak, J.L. Mitchell, C.C. Jr.; Crews, J.R. Experiment, Ga. : The Association. Target-MOTAD was used to assess the risks and returns of sustainable cotton crop rotations from Auburn University's 92-year "Old Rotation." Study results analyze rotations of continuous cotton, with and without winter legumes; two years of cotton-winter legumes-corn, with and without nitrogen fertilization; and three years of cotton-winter legumes-corn and rye-soybeans double-cropped. Ten years of observations on

deviations from target income were used to identify optimal sustainable rotation(s). Study results suggest that diversification in rotations, as well as in crops, results in the least risk for a given level of target income. Southern journal of agricultural economics - Southern Agricultural Economics Association. July 1990. v. 22 (1). p. 145-153. Includes references. (NAL Call No.: DNAL HD101.S6).

1496

### Rotational cropping sequence affects yield of corn and soybean.

AGUOAT. Crookston, R.K. Kurle, J.E.; Copeland, P.J.; Ford, J.H.; Lueschen, W.E. Madison, Wis. : American Society of Agronomy. There are numerous reports of the beneficial effects of rotating corn (*Zea mays* L.) and soybean *Glycine max* (L.) Merr. However, few studies have been specifically designed to document the important corn-soybean rotation effect. The objective of this study was to determine the impact of various corn and soybean cropping patterns on the yield of both crops. The 9-year field study conducted at two locations was managed for maximum production. Cropping sequences consisted of: continuous monoculture with the same cultivar; continuous monoculture with cultivars alternated; annual rotation of the two crops; and 1, 2, 3, 4, and 5 yr of monoculture following 5 yr of the other crop. Annually rotated corn yielded 10% better, and first-year corn yielded 15% better than corn under monoculture. Annually rotated soybean yielded 8% better, and first year soybean yielded 17% better than soybean under monoculture. With monoculture of either crop, alternating two different cultivars annually resulted in the same yield as continuous cropping of just one cultivar. There were differences in the response of the two crops to increasing years of monoculture: the lowest corn yield was from second year corn; the lowest soybean yield was from extended monoculture. Total corn dry weight was affected by cropping sequence but soybean dry weight was not. Our data suggest that, from a yield standpoint a superior cropping sequence for Minnesota would include at least three, and possibly more crops. Agronomy journal. Jan/Feb 1991. v. 83 (1). p. 108-113. Includes references. (NAL Call No.: DNAL 4 AM34P).

1497

### Soil denitrification and nitrification potentials during the growing season relative to tillage.

SSSJD4. Staley, T.E. Caskey, W.H.; Boyer, D.G. Madison, Wis. : The Society. Soil management practice, through the alteration of various biological processes, can have a profound effect on nutrient availability to crops. During the growing season, the effect of no-tillage (NT) or conventional tillage (CT), location (between or within row), and N rate (0 or 56 kg N ha<sup>-1</sup>) on soil potential denitrification activity (PDA) and potential nitrification activity (PNA) was investigated.

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A Gilpin silt loam (fine-loamy, mixed, mesic Typic Hapludults) was selected and maize (*Zea mays* L.) was planted. For both PDA and PNA, most of the activity was concentrated in the soil surface (0-3.8-cm) layer, especially under NT, and decreased to barely detectable levels in the deepest (15-30-cm) layer examined. Significant main effects were found for tillage, season, and location for PDA in the soil surface layer. Tillage interacted only with season, resulting in an increase in POA under NT, and a lack of response under CT, during the growing season in both the soil surface and the 3.8- to 7.6-cm layers. For PNA in the soil surface layer, significant main effects were found for all treatments. Only location interacted with tillage, resulting in a 50% increase in PNA from within rows to between rows under NT, and a lack of response under CT. In the 3.8- to 7.6-cm layer, the lowest order interaction was significant. In the 7.6- to 15-cm layer, PNA increased more rapidly under CT than NT during the growing season. These results demonstrate the importance of considering spatial distribution and time when these microbial activities are examined in tillage studies, and suggest that N losses under NT should exceed those under CT. Soil Science Society of America journal. Nov/Dec 1990. v. 54 (6). p. 1602-1608. Includes references. (NAL Call No.: ONAL 56.9 S03).

1498

### Spread of corn anthracnose from surface residues in continuous corn and corn-soybean rotation plots.

PHYTAJ. Lipps, P.E. St. Paul, Minn. : American Phytopathological Society. *Phytopathology*. June 1988. v. 78 (6). p. 756-761. Includes references. (NAL Call No.: DNAL 464.8 P56).

1499

### Sustaining soil nitrogen for corn using hairy vetch cover crop.

AGJOAT. Utomo, M. Frye, W.W.; Blevins, R.L. Madison, Wis. : American Society of Agronomy. Nitrogen fertility management is often complicated by inadequate supply, low efficiency, high losses, and the potential of polluting water resources. This study was conducted in 1984 and 1985 on a Maury soil (fine, mixed, mesic Typic Paleudalfs) in Kentucky to determine the role of a hairy vetch (*Vicia villosa* Roth) cover crop in sustaining soil N for corn (*Zea mays* L.) under no-tillage and conventional tillage. Winter cover treatments of hairy vetch, rye (*Secale cereale* L.), and corn residue were combined factorially with N rates of 0, 85, and 170 kg ha<sup>-1</sup> the two tillage systems. Total soil C and N in the 0- to 7.5-cm depth, averaged across treatments and sampling dates, were 21.8 and 2.07 g kg<sup>-1</sup>, respectively, in no-tillage and 16.6 and 1.70 g kg<sup>-1</sup> in conventional tillage. Values were 19.8 and 1.99 g kg<sup>-1</sup>, respectively, with hairy vetch and 18.8 and 1.80 g kg<sup>-1</sup> with rye. Conventional tillage caused rapid mineralization of soil N, as indicated by greater inorganic N

approximately 6 wk after plowing. Nitrate apparently leached deeper into the soil under no-tillage than conventional tillage. Grain yield without N on the vetch treatment was essentially equal to yields with 170 kg N ha<sup>-1</sup> on the rye or corn residue treatments-6.75, 6.75, and 6.65 Mg ha<sup>-1</sup>, respectively. Grain yield with vetch and 170 kg N ha<sup>-1</sup> was 7.85 Mg ha<sup>-1</sup>. Although vetch provided a substantial amount of N, results suggested that to obtain optimum corn yields N fertilization should be reduced little, if any, with a vetch cover crop. Vetch appeared to add grain yield instead of reduce the need for N fertilizer. *Agronomy journal*. Sept/Oct 1990. v. 82 (5). p. 979-983. Includes references. (NAL Call No.: DNAL 4 AM34P).

1500

### Systems approach to weed management in irrigated crops.

WEESA6. Schweizer, E.E. Lybecker, O.W.; Zimdahl, R.L. Champaign, Ill. : Weed Science Society of America. The impact of four weed management systems on weed seed reserves in soil, yearly weed problem, and production of barley, corn, pinto bean, and sugarbeet was assessed where these crops were grown in rotation for 4 consecutive years in four cropping sequences. Weeds were controlled in each crop with only conventional tillage or conventional tillage plus minimum, moderate (system 1), and intensive (system 2) levels of herbicides. Seed of annual weeds from 11 genera were identified, with barnyardgrass and redroot pigweed comprising 66 and 19%, respectively, of the initial 90 million weed seed/ha present in the upper 25 cm of the soil profile. After the fourth cropping year, overall decline in the total number of weed seed in soil was 53% when averaged over four cropping sequences and four weed management systems. Over the 4-yr period, about 10 times more weeds escaped control in system 1 than in system 2; and within a crop, the fewest number of weeds escaped control annually in barley. System 2 had the highest herbicide use in each cropping sequence, the fewest weeds at harvest, and the smallest adjusted gross return over the 4-yr period in three of four cropping sequences. *Weed science*. Nov 1988. v. 36 (6). p. 840-845. Includes references. (NAL Call No.: ONAL 79.8 W41).

1501

### Temporal variations in soil structural properties under corn and soybean cropping.

SOSCAK. Ellsworth, T.R. Clapp, C.E.; Blake, G.R. Baltimore, Md. : Williams & Wilkins. *Soil science*. June 1991. v. 151 (6). p. 405-416. Includes references. (NAL Call No.: ONAL 56.8 S03).

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1502

### Tillage and cover crop management for soil water conservation.

AGJOAT. Munawar, A. Blevins, R.L.; Frye, W.W.; Saul, M.R. Madison, Wis. : American Society of Agronomy. The effectiveness of a conservation tillage system depends on the amount and distribution of plant residues left on the soil surface. We determined effects of tillage systems, N fertilizer rates, and cover crop management on soil temperature, soil moisture, and corn (*Zea mays L.*) yields. Tillage treatments were chisel-plow tillage, conventional tillage (moldboard plowing and disk) disk tillage, and no-tillage Nitrogen fertilizer at rates of 0, 75, 150, or 225 kg N ha<sup>-1</sup> were broadcast on the soil surface. Rye (*Secale cereale L.*) on one-half of each split plot was killed 3 wk before corn planting time, while the other half was allowed to grow until the corn was planted. Corn yields in 1986 were 4.41, 4.03, 3.64, and 2.25 Mg ha<sup>-1</sup> for no-tillage, chisel-plow tillage, disk tillage, and conventional tillage, respectively. The yields were significantly greater with early killed rye (3.85 and 5.05 Mg ha<sup>-1</sup> in 1986 and 1987, respectively) than with late-killed rye (3.32 and 4.58 Mg ha<sup>-1</sup> in 1986 and 1987, respectively). Soil temperature tended to be slightly higher under the late-killed rye mulch in 1986 with no significant difference in 1985. Soil moisture content was significantly higher for early killed rye treatment in the early part of the season in 1986 because there was less soil moisture depletion due to the growing rye. *Agronomy journal*. July/Aug 1990. v. 82 (4). p. 773-777. Includes references. (NAL Call No.: DNAL 4 AM34P).

1503

### Tillage and multiple cropping systems and population dynamics of phytoparasitic nematodes.

AANEEF. Gallaher, R.N. Dickson, D.W.; Corella, J.F.; Hewlett, T.E. Lawrence, Kan. : Society of Nematologists. *Annals of applied nematology*. Oct 1988. v. 2. p. 90-94. Includes references. (NAL Call No.: DNAL SB998.N4A5).

1504

### Tillage and planting system effects on corn emergence from Norfolk loamy sand.

AAREEZ. Karlen, D.L. New York, N.Y. : Springer. Nonuniform emergence and slow, early season growth of corn (*Zea mays L.*) have been consistent problems for conservation tillage (CT) in southeastern Coastal Plain. Low soil temperature often causes similar problems in the Corn Belt, but previous research showed that it was not the problem. The effects of preplant tillage and various CT planting systems on seedbed water content and corn emergence were measured in one laboratory and five field studies that were conducted on Norfolk (Typic Paludult) loamy sand. Seedbed water content and seedling emergence were measured frequently after planting. Without

prior disking to kill winter weeds, seedbed water content was significantly lower in three of five studies, and seedling emergence was slower in four studies. The laboratory experiment confirmed that emergence was slower when seedbed water content was less than 50 g/kg (5%). Applying irrigation water within 24 hours after planting increased emergence from CT treatments in one study, but decreased it in another because of surface crusting. Using in-row subsoil planting systems that prepare good seedbed conditions, and planters designed for rough seedbeds improved seedling emergence in CT treatments. Results show that factors affecting seedbed water content can explain emergence and stand establishment problems better than soil temperature for CT systems on sandy Coastal Plain soils. Applied agricultural research. Summer 1989. v. 4 (3). p. 190-195. Includes references. (NAL Call No.: DNAL S539.5.A77).

1505

### Tillage and simulated rainfall intensity effect on bromide movement in an Argiudoll.

SSJD4. Bicki, T.J. Guo, L. Madison, Wis. : The Society. Movement of Br<sup>-</sup> in a Flanagan silt loam (fine, montmorillonitic, mesic Aquic Argiudoll) managed under five different tillage systems and subjected to three simulated rainfall intensities was documented. Under low (10 mm/h) and medium (25 mm/h) simulated rainfall intensities, movement of Br<sup>-</sup> in the soil profile was not significantly different between moldboard plow, chisel plow, disk plow, para-till, and no-till systems. When subjected to a high simulated rainfall intensity, significantly greater Br<sup>-</sup> movement occurred in the soil profile managed under continuous, long-term no-till. Greater movement of Br<sup>-</sup> in the no-till soil was attributed to preferential flow. *Soil Science Society of America journal*. May/June 1991. v. 55 (3). p. 794-799. Includes references. (NAL Call No.: DNAL 56.9 S03).

1506

### Tillage effects on availability of nitrogen to corn following a winter green manure crop.

SSJD4. Sarrantonio, M. Scott, T.W. Madison, Wis. : The Society. Field studies were conducted in 1984 through 1986 to investigate the release of inorganic N to corn (*Zea mays L.*) following a winter annual green manure crop of hairy vetch (*Vicia villosa Roth*) that had either been plowed down to 22 cm (conventional tillage, CT), or killed and left on the surface (no-till, NT). Soil samples were taken regularly throughout the season at three depths (0-7.5 cm, 7.5-22 cm and 22-45 cm) and analyzed for inorganic N. Crop growth and N uptake, as well as various other plant, soil and environmental parameters were also monitored. First year data (1985) show that soil inorganic N concentration in vetch treatments was higher under CT than NT, and it was more evenly distributed throughout the plow layer. Both corn yields and N uptake, however, were significantly higher in the NT system, probably

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because of higher soil moisture content in a dry summer. Vetch did not stimulate significant yield increases over O-N control plots in either tillage system, although there was greater N uptake by corn in vetch treatments. Under NT, 29% of the original N in the above-ground vetch biomass was measured either as soil inorganic N or corn N. Under CT, 56% of the original vetch N was measured. A repeat of the first experiment was conducted in 1986. Again, higher levels of inorganic N occurred under CT than under NT where vetch had been grown. Contrary to the results of 1985, corn yields were significantly higher in CT treatments than NT treatments at all N levels, and both corn yield and N uptake were significantly higher in vetch treatments than control treatments under both tillage systems. Maximum inorganic N levels were measured in late October in 1986, when 22% and 55% of the original vetch N was measured under NT and CT tillage systems, respectively. Soil Science Society of America journal. Nov/Dec 1988. v. 52 (6). p. 1661-1668. Includes references. (NAL Call No.: DNAL 56.9 S03).

1507

**Tillage effects on sediment and soluble nutrient losses from a Maury silt loam soil.**  
JEVQAA. Blevins, R.L. Frye, W.W.; Baldwin, P.L.; Robertson, S.D. Madison, Wis. : American Society of Agronomy. As the role of nonpoint-source contamination of surface waters becomes more evident, increasingly more attention is focused on the effects of agricultural practices on soil erosion and water quality. Tillage systems are known to affect the amount of water moving over the surface and through the soil. This study compared the contributions of three tillage systems used in corn (*Zea mays L.*) production with (i) sediment losses and surface runoff and (ii) the potential for nonpoint-source surface water pollution from N and P fertilizers and triazine herbicides. Tillage treatments were no-tillage, chisel-plow tillage, and conventional tillage (moldboard plow plus secondary tillage). The study site was on a Maury silt loam (Typic Paleudalfs). Over the 4-yr period, conventional tillage runoff volume was 576.7 kL ha<sup>-1</sup>, chisel-plow 205.7 kL ha<sup>-1</sup>, and no-tillage 239.9 kL ha<sup>-1</sup>. Total soil loss from conventional tillage was 19.79 Mg ha<sup>-1</sup>, chisel plow 0.71 Mg ha<sup>-1</sup>, and no-tillage 0.55 Mg ha<sup>-1</sup>. Amounts of NO<sub>3</sub>(-), soluble P, and atrazine leaving the plots in surface runoff were greatest from conventional tillage and about equal from chisel-plow and no-tillage. The magnitudes of the losses in surface runoff water were small for all chemicals measured. Journal of environmental quality. Oct/Dec 1990. v. 19 (4). p. 683-686. Includes references. (NAL Call No.: DNAL QH540.J6).

1508

**Tillage system effects on crop growth and production costs for a corn-soybean rotation.**  
JPRAEN. Brown, H.J. Cruse, R.M.; Colvin, T.S. Madison, Wis. : American Society of Agronomy. Journal of production agriculture. July/Sept 1989. v. 2 (3). p. 273-279. Includes references. (NAL Call No.: DNAL S539.5.J68).

1509

**Use of winter wheat (*Triticum aestivum*) cultivars and herbicides in aiding weed control in an ecofallow corn (*Zea mays*) rotation.**  
WEESAG. Ramsel, R.E. Wicks, G.A. Champaign, Ill. : Weed Science Society of America. Abstract: An experiment involving six winter wheat (*Triticum aestivum L.*) cultivars, an early-April herbicide application on wheat and on four dates after wheat harvest, and the growth of a subsequently planted corn (*Zea mays L.*) crop was conducted at North Platte, NE. 'Centurk 78' suppressed barnyardgrass *Echinochloa crus-galli* (L.) Beauv. ~ ECHCG more than 'Bennett' and 'Eagle' in the growing wheat and after wheat harvest in July, but there were no differences in weed yield among cultivars in corn planted 11 months later. Herbicides applied to the tillering wheat in early April improved weed control in wheat and the subsequent corn crop. Also, herbicides were applied 5, 25, 45, and 300 days after wheat harvest. Weed growth increased and soil water decreased as spraying dates were delayed. Herbicides applied 5 days after harvest did not maintain adequate weed control in the corn planted 11 months after wheat harvest and low corn yield resulted. Plots receiving herbicides 300 days after wheat harvest had the least soil water in the fall after wheat harvest but the best weed control in corn and highest corn yields because of better weed control in corn. Weed science. May 1988. v. 36 (3). p. 394-398. Includes references. (NAL Call No.: DNAL 79.8 W41).

1510

**Vegetation management and corn growth and yield in untilled mixed-species perennial sod.**  
AGJOAT. Buhler, D.D. Mercurio, J.C. Madison, Wis. : American Society of Agronomy. Agronomy journal. May/June 1988. v. 80 (3). p. 454-462. Includes references. (NAL Call No.: DNAL 4 AM34P).

1511

**Velvetleaf (*Abutilon theophrasti*) growth and development in conventional and no-tillage corn (*Zea mays*).**  
WEESAG. Defelice, M.S. Witt, W.W.; Barrett, M. Champaign, Ill. : Weed Science Society of America. Monoculture velvetleaf had greater dry weight, growth rate, leaf area index, and height than velvetleaf grown in association with conventional or no-tillage corn.

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Velvetleaf planted 5 weeks after corn had significantly lower dry weight, leaf area index, and height compared to velvetleaf planted at the same time as corn. The combination of interference from corn and delayed planting caused a significant reduction in velvetleaf population at the end of the season, delayed the date of 50% velvetleaf flowering, increased the number of days required for 50% flowering, and reduced the number of capsules per plant. Velvetleaf dry weight/hectare and leaf area index increased as plant population increased. Velvetleaf dry weight, leaf area, capsules, and seed/plant decreased as plant density increased. There were no differences in vegetative or reproductive growth between velvetleaf grown in conventional or no-tillage area. Weed science. Sept 1988. v. 36 (5). p. 609-615. Includes references. (NAL Call No.: DNAL 79.8 W41).

1512

**Water management with conservation tillage.**  
Unger, P.W. Gerard, C.J.; Matocha, J.E.; Hons, F.M.; Bordovsky, D.G.; Wendt, C.W. College Station, Tex. : Texas Agricultural Experiment Station, Texas A&M Univ System, 1988. Conservation tillage in Texas / edited by F.M. Hons. Literature review. p. 10-15. Includes references. (NAL Call No.: DNAL S543.T4T43 no.15).

1513

**Weed seed population response to tillage and herbicide use in three irrigated cropping sequences.**  
WEESA6. Ball, D.A. Miller, S.D. Champaign, Ill. : Weed Science Society of America. Research was conducted to evaluate the effects of primary tillage (moldboard plowing and chisel plowing), secondary tillage (row cultivation), and herbicides on weed species changes in the soil seed bank in three irrigated row cropping sequences over a 3-yr period. The cropping sequences consisted of continuous corn for 3 yr (CN), continuous pinto beans for 3 yr (PB), and sugarbeets for 2 yr followed by corn in the third year (SB). A comparison between moldboard and chisel plowing indicated that weed seed were more prevalent near the soil surface after chisel plowing. The density of certain annual weed seed over the 3-yr period increased more rapidly in the seed bank after chisel plowing compared to moldboard plowing. Species exhibiting the most pronounced increase included hairy nightshade and stinkgrass in the PB cropping sequence and redroot pigweed and common lambsquarters in the SB sequence. Conversely, kochia seed density in the SB sequence decreased more rapidly in chisel-plowed plots. Row cultivation generally reduced seed bank densities of most species compared to uncultivated plots. Herbicide use in each cropping sequence produced a shift in the weed seed bank in favor of species less susceptible to applied herbicides. In particular, seed of hairy nightshade became prevalent in the PB cropping sequence, and seed

of kochia, redroot pigweed, and common lambsquarters became prevalent in the SB sequence. Weed science. Nov 1990. v. 38 (6). p. 511-517. Includes references. (NAL Call No.: DNAL 79.8 W41).

1514

**Weed seed populations in ridge and conventional tillage.**

WEESA6. Forcella, F. Lindstrom, M.J. Champaign, Ill. : Weed Science Society of America. Weed seed and seedling populations, and weed competition were compared in plots of continuous corn and corn/soybean rotation under ridge and conventional tillage. After 7 to 8 yr of standard chemical and mechanical weed control, from 1500 to 3000 weed seeds/m<sup>2</sup> (to a 10-cm depth) were found in continuous corn with ridge tillage whereas about two-thirds fewer seeds were found in conventionally tilled corn. Soil from a corn/soybean rotation had from 200 to 700 seeds/m<sup>2</sup> in both tillage systems. Annual loss of weed seeds from the soil through germination was from 3 to 12% in ridge tillage and 11 to 43% in conventional tillage. Additions to the seed pool were supplied by small weeds whose germination was stimulated by "layby" cultivation, with up to 10 times more emergence and 140 times more seed production in ridge than in conventional tillage. Withholding herbicides for 1 yr reduced yields of continuous corn by 10 to 27% in ridge tillage, only 2 to 4% in conventional tillage, and negligibly in corn/soybean rotations regardless of tillage. Reducing seed production of small layby weeds in ridge tillage may aid in solving the weed problem in this conservation tillage system. Nomenclature: Corn, Zea mays L.; soybean, Glycine max (L.) Merr. Weed science. July 1988. v. 36 (4). p. 500-503. Includes references. (NAL Call No.: DNAL 79.8 W41).

1515

**Western corn rootworm damage: effect of tillage on plant response and grain yield.**

CRPSAY. Riedell, W.E. Gustin, R.D.; Beck, D.L.; Hanson, D.G. Madison, Wis. : Crop Science Society of America. Corn rootworms (*Diabrotica* spp.) are the most economically destructive insect pests of corn (*Zea mays* L.) in the U.S. Midwest. The objective of this 2-yr field study was to measure plant response and yield under ridge tillage or spring disk tillage in fields artificially infested with western corn rootworm (*D. virgifera virgifera* LeConte). Corn rootworm infestations were applied at 0, 1650, 3300, or 6600 viable eggs m<sup>-1</sup>. We measured insect survival to adult, root damage ratings, nodal root volume (Nodes 4 and above) at maximum insect damage, and grain yield. In 1988, which was characterized by above-normal temperature and below-normal precipitation, root damage increased (6.7 rating at 1650 eggs m<sup>-1</sup> to 7.9 at 6600 eggs m<sup>-1</sup>) and insect survival to adult decreased (4.9% at 1650 eggs m<sup>-1</sup> to 1.2% at 6600 eggs m<sup>-1</sup>) with increasing infestation level under both tillage systems. During the 1988 season, plants grown under

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ridge tillage had larger nodal root systems (17.9 mL) than under spring disk tillage (9.9 mL). Ridge-tilled plants also had greater yield (5.5 vs. 4.1 Mg ha<sup>-1</sup> with no rootworm eggs; 4.3 vs. 3.1 with 1650 eggs m<sup>-1</sup>; and 4.1 vs. 2.2 Mg ha<sup>-1</sup> with 3300 eggs m<sup>-1</sup>). In 1989, which had near normal temperature but below-normal precipitation during the growing season, root damage increased (from a 1.1 to 5.9 rating as the infestation level increased from 0 to 6600 eggs m<sup>-1</sup>) and insect survival to adult decreased (from 1.3 to 0.7% as the infestation level increased from 1650 to 6600 eggs m<sup>-1</sup>) under both tillage systems. Tillage practice had no effect on plant response to rootworm feeding or yield. However, the number of nodal root axes per plant (22.4) and grain yield (8.8 Mg ha<sup>-1</sup>) were increased significantly under both tillage systems infested with 6600 eggs m<sup>-1</sup> of row (29.0 axes per plant and 10.2 Mg ha<sup>-1</sup>). These results suggest that during a hot, dry growing season, ridge tillage increased yield for uninfested and rootworm-infested plants when compared with yield. Crop science. Sept/Oct 1991. v. 31 (5). p. 1293-1297. Includes references. (NAL Call No.: DNAL 64.8 C883).

1516

**Winter survival of Heliothis zea (Boddie) in cultivated and noncultivated soil in the southern Texas high plains.**  
SENTD. Rummel, D.R. Nece, K.C. College Station, Tex. : Southwestern Entomological Society. The Southwestern entomologist. June 1989. v. 14 (2). p. 117-125. illl. Includes references. (NAL Call No.: DNAL QL461.S65).

1517

**Woolly cupgrass (*Eriochloa villosa*) control in (*Zea mays*) with pendimethalin/triazine combinations and cultivation.**  
WEESA6. Schuh, J.F. Harvey, R.G. Champaign, Ill. : Weed Science Society of America. In 1985, 1986, and 1987, pendimethalin at 1.7 kg ai/ha plus 2.2 kg ai/ha cyanazine, 2.2 kg ai/ha atrazine, or 1.1 kg/ha atrazine plus 1.1 kg/ha cyanazine was applied delayed preemergence, early postemergence, and postemergence with and without cultivation to evaluate woolly cupgrass control and corn injury. Results varied from year to year. Dry conditions in 1985 resulted in poorer woolly cupgrass control while cold and wet environments in 1987 resulted in corn injury and reduced yields from postemergence treatments containing cyanazine. Good early-season suppression of woolly cupgrass deteriorated to less than 75% control by the late-season evaluation in all experiments. The best woolly cupgrass control and highest corn yields were usually achieved when herbicide applications were followed by row cultivation. Corn yield increases averaged 28, 17, and 11% in 1985, 1986, and 1987, respectively, when a herbicide treatment was followed by row cultivation. Pendimethalin/triazine treatments followed with a row cultivation adequately suppressed woolly cupgrass in field corn, but

adverse environmental conditions often reduced herbicide effectiveness or increased corn injury. Weed science. May 1989. v. 37 (3). p. 405-411. Includes references. (NAL Call No.: DNAL 79.8 W41).

# SOIL EROSION AND RECLAMATION

1518

## Commodity programs and the internalization of erosion costs: Do they affect crop rotation decisions?

Poe, G.L. Klemme, R.M.; McComb, S.J.; Ambrosius, J.E. East Lansing, Mich. : Michigan State University. This paper investigates the impact of commodity programs and the internalization of erosion costs on crop rotation decisions. Not surprisingly, commodity programs are found to shift decisions toward more erosive rotations. Internalization of on-site and off-site erosion costs calculated under real interest rates of 2 and 4 percent and planning horizons of 20 and 40 years affect rotation decisions under historical market conditions. Under conditions of commodity program participation, internalization of erosion costs affect rotation decisions only when lengthy time horizons (40 years) are considered. The impact of cross-compliance restrictions on rotation decisions is also examined. Review of agricultural economics. July 1991. v. 13 (2). p. 223-235. Includes references. (NAL Call No.: DNAL HD1773.A3N6).

1519

## Detachment of soil as affected by fertility management and crop rotations.

SSJD4. Hussain, S.K. Mielke, L.N.; Skopp, J. Madison, Wis. : The Society. An experiment was initiated on Sharpsburg silty clay loam (fine, montmorillonitic, mesic Typic Argiudoll) in 1981 to compare the effects of fertility management and crop practices on splash detachment of soil. Experimental treatments included comparisons of crop rotations of soybean *Glycine max* (L.) Merr. after corn (*Zea mays* L.) (SB), corn after soybean (C), and oat/red and yellow sweetclover (*Avena sativa* L./*Trifolium pratense* L. and *Melilotus officinalis* Lam.) after corn (O/CL). For each crop rotation, there were two management options, either added manure (OR) or herbicide plus chemical fertilizer (HF). The seventh treatment was continuous corn (CC) with herbicide, chemical fertilizer, and insecticide. Soil surface samples from each treatment were subjected to rainfall intensities of low (35 mm h<sup>-1</sup>), medium (62 mm h<sup>-1</sup>), and high (120 mm h<sup>-1</sup>). Total splash detachment of soil from simulated rainfall was linearly related to rainfall intensity. For all crop rotation treatments, total splash detachment generally was greater for manured soils than from soil with herbicides and fertilizer. Continuous corn had the lowest soil splash detachment at low intensity, second highest splash detachment at medium intensity, and the highest splash detachment at high intensity. This trend clearly indicated that rate of splash detachment of CC was higher than from soil under crop rotations. The splash detachment rates were 48, 40, 39, and 31 mg cm<sup>-3</sup> for CC, C, SB, and O/CL, respectively. Treatment by rainfall intensity interaction was significant, which suggested that intensity and crop rotation were not independent in their effect on soil splash detachment. Soil aggregation as inferred from geometric mean

diameter (GMD) indicated that CC had the lowest degree of aggregation (150) as compared to 211 for C, 225 for SB, and 313 for O/CL. Soil Science Society of America journal. Sept/Oct 1988. v. 52 (5). p. 1463-1468. Includes references. (NAL Call No.: DNAL 56.9 S03).

1520

## Diurnal abundance and spatial distribution of armyworm, (*Lepidoptera: Noctuidae*) in no-till corn.

JESCEP. Laub, C.A. Luna, J.M. Tifton, Ga. : Georgia Entomological Society. Journal of entomological science. Apr 1991. v. 26 (2). p. 261-266. Includes references. (NAL Call No.: DNAL QL461.G4).

1521

## Effect of post-planting soil surface residue levels on corn performance in the semiarid northern Great Plains.

NDKRA. Bauer, A. Black, A.L.; Merrill, S.D. Fargo, N.D. : The Station. North Dakota research report - North Dakota Agricultural Experiment Station. Sept 1991. (113). 36 p. Includes references. (NAL Call No.: DNAL 100 N813R).

1522

## Effects of tillage with different crop residues on runoff and soil loss.

TAAEA. McGregor, K.C. Mutchler, C.K.; Romkens, M.J.M. St. Joseph, Mich. : American Society of Agricultural Engineers. Simulated rainfall at a rate of 64 mm/h was applied to 3.4 X 10.7-m plots during 60-min initial, 30-min wet, and 30-min very wet runs. Treatments included tillage of two diskings on plots with corn residue, wheat residue, or no crop residue. Soil losses, adjusted to a 4% slope, from three replications of corn, fallow, and wheat plots averaged 4.88, 8.07, and 0.77 t/ha, respectively, during the initial 60-min runs; 2.73, 3.95, and 0.45 t/ha, respectively, during the 30-min wet runs; and 2.91, 4.63, and 0.51 t/ha, respectively, during the 30-min very wet runs. Total soil loss from the two hours of rainfall averaged 10.52, 16.65, and 1.73 t/ha for corn, fallow, and wheat, respectively. Extremely low soil losses from the wheat plots compared to corn and fallow plots occurred because two diskings were sufficient to incorporate corn residues but left substantial amounts of wheat residues on the surface. Effects of surface cover were removed by using mulch factor adjustments for average surface cover of 15, 79, and 0% for corn, wheat, and fallow plots, respectively. This resulted in very similar values for adjusted soil losses for all treatments. Results indicate that soil erosion benefits credited to incorporation of crop residues are not merited for recently incorporated residues. Transactions of the ASAE. Sept/Oct 1990. v. 33 (5). p. 1551-1556. Includes references. (NAL Call No.: DNAL 290.9

## (SOIL EROSION AND RECLAMATION)

AM32T).

1523

**Evaluation of soil loss after 100 years of soil and crop management.**  
AGJOAT. Gantzer, C.J. Anderson, S.H.; Thompson, A.L.; Brown, J.R. Madison, Wis. : American Society of Agronomy. Sanborn Field, at the University of Missouri-Columbia was established in 1888 and is the oldest agricultural experiment field west of the Mississippi River. It provides an excellent opportunity to document how long-term crop rotations, and soil management influence soil erosion. Analyses of topsoil thickness are presented to describe soil remaining after 100 yr of cropping in plots planted to continuous corn (*Zea mays L.*), to continuous timothy (*Phleum pratense L.*), and to a 6-yr rotation cropped sequentially to corn, oat (*Avena sativa L.*), wheat (*Triticum aestivum*), clover (*Trifolium pratense*), timothy, and timothy. Topsoil thickness was significantly less for the continuous corn than the 6-yr rotation or timothy plots after 100 yr of cropping. Corn plots had only about 44%, and the rotation plots had only about 70% as much topsoil as did the timothy plots. The amount of clay in the plow layer was significantly higher in the corn plots compared to either the rotation or timothy plots suggesting that mixing of clay subsoil within the plow layer occurred in corn plots. Agronomy journal. Paper presented at the Symposium on Long-Term Field Research, October 17-18, 1989. Jan/Feb 1991. v. 83 (1). p. 74-77. Includes references. (NAL Call No.: DNAL 4 AM34P).

1524

**Ground water quality implications of soil conservation measures: an economic perspective.**  
WARBA. Setia, P. Piper, S. Bethesda, Md. : American Water Resources Association. An evaluation of the intermedia movement of pesticides applied under various land management systems already in place, or to be implemented, under the Conservation Reserve and Conservation Compliance programs is presented. The simulation modeling approach followed in this analysis consists of a mathematical programming model and leaching/surface runoff, Pesticide Root Zone Model (PRZM) models. Special care was taken to ensure that the physical model was sensitive to the chemical characteristics of individual pesticides and the important physical changes brought about by different agricultural practices. Results show that, although these programs as now planned, increase farm income and achieve soil conservation goals, they may adversely affect ground water quality. Also, depending on soil and location characteristics, there are tradeoffs between surface and ground water quality implications. Hence, if these programs are to address water quality problems, the recommended practices must be evaluated for their impact on water quality, particularly in potentially vulnerable areas. Water resources bulletin. Mar/Apr 1991. v. 27 (2). p. 201-208.

Includes references. (NAL Call No.: DNAL 292.9 AM34).

1525

**Intercropping corn in perennial cool-season grass on irrigated sandy soil.**  
UPRAEN. Klocke, N.L. Nichols, J.T.; Grabouski, P.H.; Todd, R. Madison, Wis. : American Society of Agronomy. Journal of production agriculture. Jan/Mar 1989. v. 2 (1). p. 42-46. Includes references. (NAL Call No.: DNAL S539.5.J68).

1526

**Relationship between weed communities in corn and infestation and damage by the stalk borer (Lepidoptera: Noctuidae).**  
JESCEP. Pavuk, D.M. Stinner, B.R. Tifton, Ga. : Georgia Entomological Society. Journal of entomological science. Apr 1991. v. 26 (2). p. 253-260. Includes references. (NAL Call No.: DNAL QL461.G4).

1527

**Soil erosion has limited effect on field scale crop productivity in the southern Piedmont.**  
SSJD4. Daniels, R.B. Gilliam, J.W.; Cassel, D.K.; Nelson, L.A. Madison, Wis. : The Society. Many studies show that slightly eroded soils outyield severely eroded soils. We believe the yield differences between slightly and severely eroded soils is in part a misinterpretation of the data based on the assumption that all parts of a field were equally productive before man-induced erosion began. The purpose of this study was to quantify the effects of surface horizon variability on the productivity of a soil map unit. Yield data from farmer-managed Piedmont fields show that all parts of a field or soil map unit are not equally productive, regardless of erosion class. When yields are compared across erosion classes by landscape position, slightly eroded soils usually outyield severely eroded soils, but the differences are small. Because the area of severely eroded soils in most fields is small, their impact on field production is slight. Our analysis shows that when landscape position and erosion class variables are combined with the area of each, the average economic loss resulting from lower crop yields of eroded Piedmont soils is only \$4.44 ha<sup>-1</sup> yr<sup>-1</sup> at 1987 prices. Soil Science Society of America journal. May/June 1989. v. 53 (3). p. 917-920. ill. Includes references. (NAL Call No.: DNAL 56.9 S03).

(SOIL EROSION AND RECLAMATION)

1528

**Soil erosion, intertemporal profit, and the soil conservation decision.**  
Pagoulatos, A. Debertin, D.L.; Sjarkowi, F. Experiment, Ga. : The Association. This study developed an intertemporal profit function to determine optimal conservation adoption strategies under alternative scenarios with respect to crop prices, relative yields, discount rates, and other assumptions. Special emphasis was placed on determining from the analysis when the switchover from conventional to soil-conserving practices should take place. Technological change was incorporated by allowing crop yields to vary over time. Our analysis thus provides a new, more precise measurement of the cumulative net benefit differential. The optimal period for switchover from conventional to soil-conserving practices was found to vary depending on the assumptions made about corn prices and discount rates. Empirical results were based on an erosion damage function (EDF) for Western Kentucky corn production. Southern journal of agricultural economics - Southern Agricultural Economics Association. Dec 1989. v. 21 (2). p. 55-62. Includes references. (NAL Call No.: DNAL HD101.S6).

1529

**Some thoughts on the potential economic impact of conservation compliance.**  
Wollenhaupt, N. Blase, M. Columbia, Mo. : Cooperative Extension Service, University of Missouri. Economic & policy information for Missouri agriculture - Department of Agricultural Economics, University of Missouri-Columbia. July 1989. v. 32 (7). 4 p. (NAL Call No.: DNAL HD1775.M8A34).

1530

**Temporal variations in soil structural properties under corn and soybean cropping.**  
SOSCAK. Ellsworth, T.R. Clapp, C.E.; Blake, G.R. Baltimore, Md. : Williams & Wilkins. Soil science. June 1991. v. 151 (6). p. 405-416. Includes references. (NAL Call No.: DNAL 56.8 S03).

# AQUACULTURE RELATED

1531

**On-farm composting of lake weeds.**  
BCYCDK. Spencer, B. Emmaus, Pa. : J.G. Press.  
BioCycle. May/June 1988. v. 29 (5). p. 54-55.  
ill. (NAL Call No.: DNAL 57.8 C734).

# ANIMAL AQUACULTURE

1532

Projected costs and returns: rice, soybeans,  
corn, milo, wheat, wheat-soybean double crop,  
crawfish, rice-crawfish double crop--Louisiana,  
1992.

Giesler, G. Heagler, A.; Baldridge, T.;  
Huffman, D.; Dellenbarger, L. Baton Rouge, La.  
: The Station. A.E.A. information series -  
Louisiana Agricultural Experiment Station. In  
the series analytic: Projected costs and  
returns and cash flows for major agricultural  
enterprises, Louisiana, 1992. Jan 1992. (101).  
p. C-1/C-90. (NAL Call No.: DNAL S67.E2).

# STRUCTURES AND STRUCTURAL EQUIPMENT

1533

**Corncribs in history, folklife & architecture**  
*/Keith E. Roe.*

Roe, Keith E. Ames : Iowa State University Press, 1988. Includes index. xi, 103 p. : ill. (some col.) ; 22 x 29 cm. Bibliography: p. 96-99. (NAL Call No.: DNAL TH4935.R64 1988).

1534

**Fungicides reduce corn drying and storage risks.**

White, D.G. Shove, G.C.; Peterson, W.H. St. Joseph, Mich. : The Society. American Society of Agricultural Engineers (Microfiche collection). Paper presented at the 1988 Summer Meeting of the American Society of Agricultural Engineers. Available for purchase from: The American Society of Agricultural Engineers, Order Dept., 2950 Niles Road, St. Joseph, Michigan 49085. Telephone the Order Dept. at (616) 429-0300 for information and prices. 1988. (fiche no. 88-6075). 11 p. Includes references. (NAL Call No.: DNAL FICHE S-72).

# FARM EQUIPMENT

1535

## Introduction to ridge-tillage for corn and soybeans.

Griffith, D.R. Parsons, S.D.; Mengel, D.B.; Mannerling, J.V.; Childs, D. West Lafayette, Ind. : The Service. Publication I.D. - Cooperative Extension Service, Purdue University. Nov 1989. (180). 8 p. (NAL Call No.: DNAL 275.29 IN2ID).

1536

## Nitrogen fertilization in ridge-till corn to reduce nitrate leaching and increase nitrogen use efficiency.

Cruse, R.M. Kohler, K.A. Ames, Iowa : The Service. PM - Iowa State University, Cooperative Extension Service. In the series analytic: Integrated Farm Management Demonstration Program. 1990 Progress Report. Jan 1991. (1417). p. 23-24. (NAL Call No.: DNAL 275.29 IO9PA).

1537

## Soil compaction, machinery selection, and optimum crop planning.

TAAEA. Lavoie, G. Gunjal, K.; Raghavan, G.S.V. St. Joseph, Mich. : American Society of Agricultural Engineers. Previous studies on the economics of soil compaction have selected the optimum machinery complement on the basis of cost minimization. In this study the revenue side of the machinery is also considered. Linear programming models are developed to maximize net farm income considering the yield loss implications of different tractor sizes, farm sizes, and weather conditions. The results indicate that grain corn cultivated conventionally is the best system for the three weather patterns: wet, dry, and average. The optimum tractor size is 140 kW for a wet year and 60 kW for a dry year and 100 kW an average year. The impact and implications on the optimum net farm income of two other cultural practices, reduced tillage and crop rotation, are also analyzed in this study. Transactions of the ASAE. Jan/Feb 1991. v. 34 (1). p. 2-8. Includes references. (NAL Call No.: DNAL 290.9 AM32T).

1538

## Tillage alternatives for alfalfa to corn rotation.

Shinners, K.J. Nelson, W.S. St. Joseph, Mich. : The Society. American Society of Agricultural Engineers (Microfiche collection). Paper presented at the 1988 Winter Meeting of the American Society of Agricultural Engineers. Available for purchase from: The American Society of Agricultural Engineers, Order Dept., 2950 Niles Road, St. Joseph, Michigan 49085. Telephone the Order Dept. at (616) 429-0300 for information and prices. 1988. (fiche no. 88-1566). 23 p. Includes references. (NAL Call No.: DNAL FICHE S-72).

# NATURAL RESOURCES

1539

**Firms foresee high stakes in emerging  
biopesticide market.**

Twombly, R. Philadelphia, Pa. : Institute for  
Scientific Information . The scientist. July 9,  
1990. v. 4 (14). p. 1, 8-9, 28. (NAL Call No.:  
DNAL Q1.S37).

# BIOMASS ENERGY SOURCES

1540

AGnews: vine weevil targeted; ag fellowship  
award; more fuel alcohol.

San Francisco, Calif. : Deborah J. Mysiewicz.  
BioEngineering news. Sept 15, 1990. v. 11 (38).  
p. 2, 8. (NAL Call No.: DNAL A00033).

# WATER RESOURCES AND MANAGEMENT

1541

Demonstration of a water management system to improve nitrogen efficiency and reduce environmental impacts.

Melvin, S.W. Kanwar, R.S.; Horton, R. Jr. Ames, Iowa : The Service. PM - Iowa State University, Cooperative Extension Service. In the series analytic: Integrated Farm Management Demonstration Program. 1990 Progress Report. Jan 1991. (1417). p. 99-102. (NAL Call No.: DNAL 275.29 I09PA).

1542

Field crop production as a source of groundwater pollution the case of corn production in Pennsylvania /edited by Robert D. Weaver.

Weaver, Robert D. University Park, Pa. : Penn State, College of Agricultural Sciences, 1991. "December 1991."~ Cover title. vii. 150 p. : ill. ; 28 cm. Includes bibliographical references. (NAL Call No.: DNAL 281.9 P38 no.227).

1543

Ground water and agricultural chemicalsunderstanding the issues /presented as a service to agriculture by the American Soybean Association and the National Corn Growers Association.

St. Louis, Mo.? : American Soybean Association : National Corn Growers Association, c1988. Abstract: This videotape defines ground water, identifies types of pollutants, and stresses the importance of the pesticide applicator's (the farmer's) responsibility to protect ground water from contamination by proper application and safe use of agricultural chemicals. It demonstrates how to reduce risks of ground water contamination by preventing back siphoning, protecting existing well heads, pressure of triple rinsing of containers, using leak free containers, securing pesticides during transport and properly mixing, loading, handling and storing pesticides away from wells and water supplies. VHS. 1 videocassette (17 min., 40 sec.) : sd., col. ; 1/2 in. (NAL Call No.: DNAL Videocassette no.924).

1544

Ground water quality implications of soil conservation measures: an economic perspective. WARBA. Setia, P. Piper, S. Bethesda, Md. : American Water Resources Association. An evaluation of the intermedia movement of pesticides applied under various land management systems already in place, or to be implemented, under the Conservation Reserve and Conservation Compliance programs is presented. The simulation modeling approach followed in this analysis consists of a mathematical programming model and leaching/surface runoff, Pesticide Root Zone Model (PRZM) models.

Special care was taken to ensure that the physical model was sensitive to the chemical characteristics of individual pesticides and the important physical changes brought about by different agricultural practices. Results show that, although these programs as now planned, increase farm income and achieve soil conservation goals, they may adversely affect ground water quality. Also, depending on soil and location characteristics, there are tradeoffs between surface and ground water quality implications. Hence, if these programs are to address water quality problems, the recommended practices must be evaluated for their impact on water quality, particularly in potentially vulnerable areas. Water resources bulletin. Mar/Apr 1991. v. 27 (2). p. 201-208. Includes references. (NAL Call No.: DNAL 292.9 AM34).

1545

Groundwater allocation in irrigated crop production.

JUPRAEN. Chanyalew, D. Featherstone, A.M.; Buller, O.H. Madison, Wis. : American Society of Agronomy. Journal of production agriculture. Jan/Mar 1989. v. 2 (1). p. 37-42. Includes references. (NAL Call No.: DNAL S539.5.J68).

1546

Groundwater quality management in Nebraska's central Platte Valley.

JSWCA3. Ferguson, R.B. Moravek, M. Ankeny, Iowa : Soil and Water Conservation Society of America. Journal of soil and water conservation. In subseries: Case studies in rural groundwater management. Throughout the nation innovative programs in response to rural groundwater quality issues. Mar/Apr 1990. v. 45 (2). p.265-266. (NAL Call No.: DNAL 56.8 J822).

1547

Lysimeter study of nitrogen fertilizer and irrigation rates on quality of recharge water and corn yield.

JEVQAA. Prunty, L. Montgomery, B.R. Madison, Wis. : American Society of Agronomy. Accrual of NO<sub>3</sub>-N to groundwater as a result of agricultural practices is a focus of environmental concern. This inquiry was conducted to quantify precisely in a replicated experiment the rate of N loading to groundwater resulting from inputs of N and irrigation water to corn (*Zea mays L.*). Input levels were designed to balance potential for high production with minimum loading of NO<sub>3</sub>-N to groundwater. Four large (2.4 by 2.4 m and 2.3 m deep) drainage lysimeters with reconstructed Hecla loamy fine sand (Aquin Haplaborolls) were employed in this southeast North Dakota study. Grain yields at N fertilizer rates of 95 and 145 kg/ha were 10.3 and 11.3 Mg/ha, respectively. Differences in yield due to irrigation and irrigation by N interaction were nonsignificant. There was no residual effect of

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N fertilizers on yield. The higher irrigation rate caused increases in drainage of water within about 30 d. The higher rate of N fertilizer, however, was not reflected by increased concentration of NO<sub>3</sub>-N in the drainage water until 325 d after application. The increased concentrations then persisted to 500 d. Flow-weighted means of N concentrations for this period were 8.6 and 12.3 mg/L for the low and high N rates, respectively. For this soil and climate, irrigation and N management can be tailored to produce NO<sub>3</sub>-N concentrations below 10 mg/L with continuous corn. However, the 5:1 economic return produced by 50 kg/ha of incremental N fertilizer means that producers are unlikely to adopt the needed practices without incentives. *Journal of environmental quality*. Apr/June 1991. v. 20 (2). p. 373-380. Includes references. (NAL Call No.: DNAL QH540.J6).

1548

### Maize production impacts on groundwater quality.

JEVQAA. Schepers, J.S. Moravek, M.G.; Alberts, E.E.; Frank, K.D. Madison, Wis. : American Society of Agronomy. The cumulative effects of management practices on nitrate-nitrogen (NO<sub>3</sub>-N) leaching and groundwater quality are frequently difficult to document because of the time required for expression and the diversity of interacting processes involved. This work reports results of a N and water management program initiated by the Central Platte Natural Resource District (CPNRD) in Nebraska. Cultural practices recommended by the CPNRD and reported by producers for the 1988 growing season, representing approximately 3900 fields covering 84 210 ha of irrigated corn (*Zea mays L.*) indicated NO<sub>3</sub>-N contamination of groundwater was influenced by yield goals and fertilizer N application rates. Groundwater NO<sub>3</sub>-N concentrations were positively correlated with residual N in the surface 0.9 m of soil prior to the growing season, reflecting the effects of past N and water management practices. Yield goals in 1988 averaged 9% higher than the average 10.0 Mg ha<sup>-1</sup> corn yield attained, which accounts for an average of about 20 kg N ha<sup>-1</sup> in excess of the average N recommendation. By comparison, in a 1980 to 1984 study from an area within the CPNRD, yield goals averaged 28% greater than actual yields. Overly optimistic yield goals in 1988 accounted for 42% of the average excess N application rate of 48 kg ha<sup>-1</sup> (based on University of Nebraska recommendations). A large portion of average excess N application is attributed to producers in 14% of the area who applied > 100 kg N ha<sup>-1</sup> more than the recommended rates. Fertilizer N applied showed little relationship to fertilizer N recommended. Better education and more stringent measures may be required to address the select group of producers who fail to follow CPNRD recommendations. *Journal of environmental quality*. Jan/Mar 1991. v. 20 (1). p. 12-16. Includes references. (NAL Call No.: DNAL QH540.J6).

1549

### Operating rules for deficit irrigation management.

TAAEA. Martin, D. Van Brocklin, J.; Wilmes, G. St. Joseph, Mich. : American Society of Agricultural Engineers. *Transactions of the ASAE*. July/Aug 1989. v. 32 (4). p. 1207-1215. Includes references. (NAL Call No.: DNAL 290.9 AM32T).

1550

### Pesticide use and water quality in Iowa.

Stoltenberg, D. Zahn, D.R. Ames, Iowa : The Service. PM - Iowa State University, Cooperative Extension Service. Nov 1990. (1394). 6 p. Includes references. (NAL Call No.: DNAL 275.29 I09PA).

1551

### Preplant irrigation in the Central and Southern High Plains--a review.

TAAEA. Musick, J.T. Lamm, F.R. St. Joseph, Mich. : American Society of Agricultural Engineers. Preplant irrigation has been widely practiced in the semi-arid High Plains since the early expansion of pump irrigation from the Ogallala Aquifer in the late 1930s. As groundwater storage continues to decline, the common practice of "heavy" water application to fully wet the root zone of graded furrow fields prior to planting is being questioned. Under some conditions, preplant irrigation is an essential practice for timely stand establishment and high yields. However, in many situations, the large application depths required for surface irrigation result in inefficient soil water storage and low yield response. With center pivot sprinkler systems, smaller and more precise preplant irrigation application amounts are possible resulting in more efficient preseason storage. We conclude that the benefits of preplant irrigation are likely to be greatest (1) when the soil profile is dry before planting; (2) when seasonal irrigations are not applied to drought-tolerant crops or are reduced in amount; (3) when early planting limits soil wetting by precipitation by the desired date; and (4) when preplant irrigation plus seasonal precipitation on deep, high water storage soils can result in moderately high irrigated yields without seasonal irrigation. The benefits are likely to be low (1) when soil profiles are moderately wet at time of irrigation; (2) when planting dates are flexible and can follow precipitation events for stand establishment; and (3) when seasonal irrigation provides adequate water to meet plant requirements. As groundwater decline continues and precipitation becomes more important for supplying crop water requirements, the use of preplant irrigation as an irrigation water management practice will likely decline in importance in the High Plains. *Transactions of the ASAE*. Literature review. Nov/Dec 1990. v. 33 (6). p. 1834-1842. Includes references. (NAL Call No.: DNAL 290.9 AM32T).

(WATER RESOURCES AND MANAGEMENT)

1552

**Simulating physical processes and economic behavior in saline, irrigated agriculture: model development.**  
WRERAO. Lefkoff, L.J. Gorelick, S.M.  
Washington, D.C. : American Geophysical Union.  
A model of an irrigated, saline stream-aquifer system is constructed to simulate economic, agronomic, and hydrologic processes. The model is applied to a section of the Arkansas Valley in southeastern Colorado and is used to examine the effect of crop-mixing strategies on long-term profits. Mixing in excess of crop rotation requirements provides an index of farmers' willingness to exchange some profit for a reduction in the risk of short-term loss. The model contains three components. The economic component simulates water use decisions that maximize annual profit for each farm. The hydrologic component simulates salt transport by employing regression equations that predict changes in groundwater salinity as a function of hydrologic conditions and water use decisions. The agronomic component approximates changes in corn and alfalfa production in response to the depth and salinity of irrigation applications. Results from the entire economic-hydrologic-agronomic model are consistent with the few historical observations available for the site. Water resources research. July 1990. v. 26 (7). p. 1359-1369. maps. Includes references. (NAL Call No.: DNAL 292.8 W295).

1553

**Take the suspense out of the season.**  
Smith, D. Philadelphia, Pa. : The Journal. Farm journal. Mid Jan 1989. v. 113 (2). p. 18-19. ill. (NAL Call No.: DNAL 6 F2212).

# DRAINAGE AND IRRIGATION

1554

**A comparison of crop stress factors determined under controlled drainage and naturally fluctuating water table conditions.**

Ahmad, N. Kanwar, R.S. St. Joseph, Mich. : The Society. American Society of Agricultural Engineers (Microfiche collection). Paper presented at the 1988 Winter Meeting of the American Society of Agricultural Engineers. Available for purchase from: The American Society of Agricultural Engineers, Order Dept., 2950 Niles Road, St. Joseph, Michigan 49085. Telephone the Order Dept. at (616) 429-0300 for information and prices. 1988. (fiche no. 88-2610). 21 p. Includes references. (NAL Call No.: DNAL FICHE S-72).

1555

**Control of nutrient mixing and uptake by irrigation frequency and relative humidity.**

AGUDAT. Kargbo, D. Skopp, J.; Knudsen, D. Madison, Wis. : American Society of Agronomy. The distribution of nutrients and water between mobile and immobile pores should influence nutrient uptake. The distribution can be regulated through control of the water-filled pore space. This research was conducted to determine the effect of varying soil-water content and water uptake upon nutrient uptake. Corn (*Zea mays L.*) was grown in a growth chamber for 2 wk at 35 or 55% relative humidity (RH). Three soils Boelus LS, 5% slope (sandy over loamy, mixed, mesic Udic Haplustoll); Boelus LS, 2% slope; and Plano Soil (fine-silty, mixed, thermic Typic Haplustoll) were watered to field capacity. Plants on each soil were allowed to extract water to one of three minimal levels before rewatering. After harvest, P and K content and other root and leaf parameters were determined. The values of minimal levels were chosen so that, for each soil, the three values ensured no low-water stress. Effective diffusion coefficients were determined for the three soils. Increased minimal levels for a soil required for frequent watering, which led to greater mixing of solutes between pores. At 55% RH, no water treatment significantly affected P and K flux, despite significant differences in diffusion coefficients. At 35% RH, however, phosphate flux to roots increased as minimum levels increased. The significant increase of phosphate flux with more frequent watering at low RH suggests that plant uptake is affected by soil physical processes other than simple diffusion and convection to individual roots. More frequent watering results in greater mixing of solute between pores containing mobile and immobile water and, consequently, greater uptake. *Agronomy journal*. Nov/Dec 1991. v. 83 (6). p. 1023-1028. Includes references. (NAL Call No.: DNAL 4 AM34P).

1556

**Corn, sorghum, and soybean response to irrigation in the Mississippi River alluvial plain.**

CRPSAY. Heatherly, L.G. Wesley, R.A.; Elmore, C.D. Madison, Wis. : Crop Science Society of America. The most agronomically efficient use of irrigation water is for those crops that give the greatest response. In the Mississippi River alluvial plain, the primary irrigated crop is soybean *Glycine max (L.) Merr.*, but the response of soybean to irrigation has not been compared to that of other crops. Irrigated and nonirrigated experiments were conducted from 1984 through 1987 on Tunica clay (clayey over loamy, montmorillonitic, nonacid, thermic Vertic Haplaquept) to determine the effect of irrigation on field-grown corn (*Zea mays L.*), sorghum *Sorghum bicolor (L.) Moench*, and soybean yield and yield components. Shifts in weed species composition resulting from continuous monocropping with these crops also were quantified. Irrigation was applied from beginning bloom to near maturity of each crop whenever soil water potential at the 30-cm soil depth averaged about -70 kPa. Irrigation did not consistently affect weed cover in any of the crops. Weed level differences among crops resulted from different weed control programs for each continuous cropping system. Differences between average seed yields of irrigated (I) and nonirrigated (NI) corn, sorghum, and soybean were 2886, 694, and 1574 kg ha<sup>-1</sup>, respectively. Sorghum produced the most stable nonirrigated yield and the smallest increase in monetary return from irrigation. Differences between I and NI corn and soybean yields were associated with increased number of seed. Smaller sorghum yield differences were associated with differences in seed weight or a combination of differences in seed weight and number of seed. Across the 4 yr, irrigation of corn and soybean produced nearly equal increases in gross income per unit of land area, but irrigation efficiency for soybean was lower because achieving the increased return from irrigation required nearly twice as much water for soybean as for corn. *Crop science*. May/June 1990. v. 30 (3). p. 665-672. Includes references. (NAL Call No.: DNAL 64.8 C883).

1557

**Effects of excessive magnesium in irrigation waters on wheat and corn growth.**

CSDSA2. Franklin, W.T. Olsen, J.S.; Soltanpour, P.N. New York, N.Y. : Marcel Dekker. Communications in soil science and plant analysis. 1991. v. 22 (i/2). p. 49-61. Includes references. (NAL Call No.: DNAL S590.C63).

1558

**Fractional integrated stomatal opening to control water stress in the field.**

CRPSAY. Fiscus, E.L. Mahbub-Ul Alam, A.N.M.; Hirasawa, T. Madison, Wis. : Crop Science Society of America. The usefulness of totally automated irrigation control systems is well

## (DRAINAGE AND IRRIGATION)

established. Mass-flow porometers can be used as the sensing and feedback elements to implement such a system for the experimental control of water stress in the field. This study was conducted to determine if consistent relationships could be established between the mass-flow readings and other water-related physiological parameters. A range of stress conditions were imposed on plots of corn (*Zea mays* L.) by the system during the 1986 and 1987 field seasons in Greeley, CO. Midday leaf xylem water potential, leaf diffusive conductance, and year-end grain yields were measured during both years. In 1987, additional measurements were made of the infrared canopy temperature for calculating the Crop Water Stress Index (CWSI), and individual kernel weights and numbers, to determine the components of the grain yield predictions observed in 1986. Reductions in the number of kernels produced per unit land area were associated with stress-induced delays of silking relative to pollen shed. Additional yield reductions in some treatments were attributable to reduced weight per kernel. Significant correlations were found between the mass-flow sensors and grain yield and CWSI. The relationship between grain yield and stomatal conductance was consistent over both years, suggesting that the cumulative mean conductance may be useful as a yield predictor. *Crop science*. July/Aug 1991. v. 31 (4). p. 1001-1008. Includes references. (NAL Call No.: DNAL 64.8 C883).

1559

**In-canopy chemigation for increased efficiency.**  
Lyle, W.M. Archer, T.L.; Bordovsky, J.P.;  
Bynum, E.D. St. Joseph, Mich. : The Society.  
American Society of Agricultural Engineers  
(Microfiche collection). Paper presented at the  
1988 Summer Meeting of the American Society of  
Agricultural Engineers. Available for purchase  
from: The American Society of Agricultural  
Engineers, Order Dept., 2950 Niles Road, St.  
Joseph, Michigan 49085. Telephone the Order  
Dept. at (616) 429-0300 for information and  
prices. 1988. (fiche no. 88-2131). 9 p.  
Includes references. (NAL Call No.: DNAL FICHE  
S-72).

1560

**Irrigation and nitrogen management effects on corn reproduction.**  
AAEPC. Jennings, G.D. Martin, D.L.; Schepers,  
J.S. St. Joseph, Mich. : The Society. Paper -  
American Society of Agricultural Engineers.  
Paper presented at the 1989 International  
Meeting, December 12-15, 1989, New Orleans,  
Louisiana. Winter 1989. (89-2692). 29 p.  
Includes references. (NAL Call No.: DNAL 290.9  
AM32P).

1561

### **Operating rules for deficit irrigation management.**

TAAEA. Martin, D. Van Brocklin, J.; Wilmes, G.  
St. Joseph, Mich. : American Society of  
Agricultural Engineers. *Transactions of the  
ASAE*. July/Aug 1989. v. 32 (4). p. 1207-1215.  
Includes references. (NAL Call No.: DNAL 290.9  
AM32T).

1562

**Perennial vine competition and control.**  
MAEBB. Elmore, C.D. Heatherly, L.G.; Wesley,  
R.A. Mississippi State, Miss. : The Station.  
*Bulletin - Mississippi Agricultural and  
Forestry Experiment Station*. Oct 1989. (964). 6  
p. ill. Includes references. (NAL Call No.:  
DNAL S79.E3).

1563

### **Pesticide movement in a coastal plain soil under irrigation.**

Ritter, W.F. Chirnside, A.E.M.; Scarborough,  
R.W. Denver, Colo. : U.S. Committee on  
Irrigation and Drainage, c1989. *Toxic  
substances in agricultural water supply and  
drainage : an int environ perspective : papers  
from the Second Pan-American Regional Conf of  
the Int Commission on Irrigation and Drainage,*  
Ottawa, Canada, June 8-9, 1989. p. 389-400.  
Includes references. (NAL Call No.: DNAL  
TD428.A37T695 1989).

1564

### **Preplant irrigation in the Central and Southern High Plains--a review.**

TAAEA. Musick, J.T. Lamm, F.R. St. Joseph,  
Mich. : American Society of Agricultural  
Engineers. Preplant irrigation has been widely  
practiced in the semi-arid High Plains since  
the early expansion of pump irrigation from the  
Ogallala Aquifer in the late 1930s. As  
groundwater storage continues to decline, the  
common practice of "heavy" water application to  
fully wet the root zone of graded furrow fields  
prior to planting is being questioned. Under  
some conditions, preplant irrigation is an  
essential practice for timely stand  
establishment and high yields. However, in many  
situations, the large application depths  
required for surface irrigation result in  
inefficient soil water storage and low yield  
response. With center pivot sprinkler systems,  
smaller and more precise preplant irrigation  
application amounts are possible resulting in  
more efficient preseason storage. We conclude  
that the benefits of preplant irrigation are  
likely to be greatest (1) when the soil profile  
is dry before planting; (2) when seasonal  
irrigations are not applied to drought-tolerant  
crops or are reduced in amount; (3) when early  
planting limits soil wetting by precipitation  
by the desired date; and (4) when preplant  
irrigation plus seasonal precipitation on deep,

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high water storage soils can result in moderately high irrigated yields without seasonal irrigation. The benefits are likely to be low (1) when soil profiles are moderately wet at time of irrigation; (2) when planting dates are flexible and can follow precipitation events for stand establishment; and (3) when seasonal irrigation provides adequate water to meet plant requirements. As groundwater decline continues and precipitation becomes more important for supplying crop water requirements, the use of preplant irrigation as an irrigation water management practice will likely decline in importance in the High Plains. Transactions of the ASAE. Literature review. Nov/Dec 1990. v. 33 (6). p. 1834-1842. Includes references. (NAL Call No.: DNAL 290.9 AM32T).

1565

**Reduced rates of chemigated chlorpyrifos for control of European corn borer (Lepidoptera: Pyralidae) in whorl stage corn.**  
JKESA. Currier, D. Witkowski, J.F. Lawrence, Kan. : The Society. Journal of the Kansas Entomological Society. Oct 1988. v. 61 (4). p. 401-405. Includes references. (NAL Call No.: DNAL 420 K13).

1566

**Sprinkler irrigation management for corn--Southern Great Plains.**  
Howell, T.A. Copeland, K.S.; Schneider, A.D.; Dusek, D.A. Washington, D.C. : The Service. Reprints - U.S. Department of Agriculture, Agricultural Research Service. Literature review. Jan/Feb 1989. 159 . p. 147-155. Includes references. (NAL Call No.: DNAL AS21.A8U5/ARS).

1567

**Sprinkler irrigation management for corn--southern great plains.**  
Howell, T.A. Copeland, K.S.; Schneider, A.D.; Dusek, D.A. St. Joseph, Mich. : The Society. American Society of Agricultural Engineers (Microfiche collection). Paper presented at the 1988 Summer Meeting of the American Society of Agricultural Engineers. Available for purchase from: The American Society of Agricultural Engineers, Order Dept., 2950 Niles Road, St. Joseph, Michigan 49085. Telephone the Order Dept. at (616) 429-0300 for information and prices. 1988. (fiche no. 88-2098). 21 p. ill. Includes references. (NAL Call No.: DNAL FICHE S-72).

1568

**Take the suspense out of the season.**  
Smith, D. Philadelphia, Pa. : The Journal. Farm journal. Mid Jan 1989. v. 113 (2). p. 18-19. ill. (NAL Call No.: DNAL 6 F22i2).

1569

**Water and nitrogen management in central Platte valley of Nebraska.**  
JIDEDH. Ferguson, R.B. Eisenhauer, D.E.; Bockstädter, T.L.; Krull, D.H.; Buttermore, G. New York, N.Y. : American Society of Civil Engineers. Journal of irrigation and drainage engineering. July/Aug 1990. v. 116 (4). p. 557-565. Includes references. (NAL Call No.: DNAL 290.9 AM3PS (IR)).

1570

**Water management with conservation tillage.**  
Unger, P.W. Gerard, C.J.; Matocha, J.E.; Hons, F.M.; Bordovsky, D.G.; Wendt, C.W. College Station, Tex. : Texas Agricultural Experiment Station, Texas A&M Univ System, 1988. Conservation tillage in Texas / edited by F.M. Hons. Literature review. p. 10-15. Includes references. (NAL Call No.: DNAL S543.T4T43 no.15).

1571

**Weed control in corn (Zea mays) as affected by till-plant systems and herbicides.**  
WETEE9. Schweizer, E.E. Zimdahl, R.L.; Mickelson, R.H. Champaign, Ill. : The Society. Weed technology : a journal of the Weed Science Society of America. Jan/Mar 1989. v. 3 (1). p. 162-165. Includes references. (NAL Call No.: DNAL SB610.W39).

# FOOD PROCESSING

1572

## Breakage susceptibility of corn kernels in relation to crop management under long growing season conditions.

AGJOAT. Vyn, T.J. Moes, J. Madison, Wis. : American Society of Agronomy. Corn (*Zea mays L.*) kernels are subject to breakage during postharvest handling. Manipulation of crop management factors has influenced kernel breakage susceptibility, but the effects of hybrid, plant density, harvest moisture content, and drying temperature on breakage susceptibility have not been studied under long growing season conditions. Field experiments were conducted in 1985 and 1986 at Ridgetown, Ontario. Five commercial hybrids were grown at different plant densities (5.5 and 7.0 plant m<sup>-2</sup> in both years, and 6.3 plants m<sup>-2</sup> in 1985), harvested at 300 and 240 g kg<sup>-1</sup> moisture content (wet basis), and dried at different air temperatures (20, 40, and 80 degrees C in 1985; 20 and 100 degrees C in 1986) to approximately 150 g kg<sup>-1</sup> moisture content. A Wisconsin breakage tester was used to measure breakage susceptibility. Small increases in breakage were consistently associated with increased plant densities. Reductions in breakage were sometimes associated with lower grain moisture content at harvest. The largest and most consistent changes in breakage susceptibility were due to changes in drying temperatures. Increased drying temperatures resulted in increased breakage, but there was variation among the hybrids in the size of the response. The results indicate that breakage susceptibility is an inherited trait that is also influenced by crop management. Kernel breakage can be reduced by proper choice of hybrids, drying in low air temperature, and harvesting at low grain moisture content. In both years, increased breakage susceptibility was related to higher levels of endosperm stress cracks, tendency towards roundness in shape, and increased levels of harvest damage in the form of visible chips or cracks. Agronomy journal. Nov/Dec 1988. v. 80 (6). p. 915-920. Includes references. (NAL Call No.: DNAL 4 AM34P).

1573

## Effect of temperature, relative humidity, and suspending menstrua on the resistance of *Listeria monocytogenes* to drying.

JFPRDR. Palumbo, S.A. Williams, A.C. Ames, Iowa : International Association of Milk, Food, and Environmental Sanitarians. The ability of *Listeria monocytogenes* to survive dehydrated storage at different temperatures (5 vs. 25 degrees C) and relative humidities (75, 59, 35, 14, and 1%) when suspended in different menstrua was studied. *L. monocytogenes* survived longer when held at 5 degrees C compared to 25 degrees C, and when suspended in beef extract, glycerol, Karo syrup, skim milk, and canned milk compared to distilled water. The contribution of relative humidity to survival was less clear, though survival tended to be longer at the lower relative humidities. At 5 degrees C when suspended in beef extract and held at relative humidities of 59% and below,

there was less than a 2 log<sub>10</sub> decline in the viable population (starting count ca. 10(5)/coverslip). *L. monocytogenes* was not injured during drying or storage at the various relative humidities. In addition, based on the Listeria selective media evaluated, these Listeria media permitted quantitative recovery of the organism dried on surfaces. These results suggested that once *L. monocytogenes* has contaminated a food processing plant, it can persist for long periods in the plant environment if the temperature is low and the organism is protected by various food components. Journal of food protection. May 1990. v. 53 (5). p. 377-381. Includes references. (NAL Call No.: DNAL 44.8 J824).

## FOOD PROCESSING, FIELD CROP

1574

### Effects of hybrid and grain damage on estimated dry matter loss for high-moisture shelled corn.

TAAEA. Stroshine, R.L. Yang, X. St. Joseph, Mich. : American Society of Agricultural Engineers. An interactive computer program was used to examine the effect of physical damage, hybrid, and weather conditions on dry matter loss during drying of 22% m.c. (wet basis) shelled corn with air at ambient conditions. Simulations used official weather data for October and November of 1969, 1975, and 1977 for locations in southwest, central, and northeast Indiana. Multipliers corrected allowable storage time for differences in grain damage and hybrid resistance to storage mold. Regardless of location or physical damage level, dry matter losses (DMLs) of the hybrids resistant to mold growth were consistently 30 to 40% lower than DMLs for susceptible hybrids. When 45% of the kernels had damage to the pericarp or were broken, there was 2.0 to 2.3 times the DML in the top layer of corn as there was when 15% had damage. The effect of damage was slightly greater in hybrids susceptible to mold invasion. Hybrid storage mold resistance had approximately the same effect as changing the percentage of damaged kernels from 45% to 30%. Allowable storage time was influenced by both corn temperature and drying time. For the location-year combinations studied, average wet bulb depression during the drying period was a good indicator of time required to dry and average wet bulb temperature was a good indicator of potential for DML. These two factors can be used to interpret the influence of weather on differences in damage and hybrid resistance. Minimum deterioration of the top layer occurred when the average wet bulb temperature was relatively low and the average wet bulb depression was large. The increase in DML for a good year versus a bad year was equivalent to changing kernel damage from 30% to 45%. Transactions of the ASAE. July/Aug 1990. v. 33 (4). p. 1291-1298. Includes references. (NAL Call No.: DNAL 290.9 AM32T).

1575

### Surface oil application effects on chemical, physical, and dry-milling properties of corn.

CECHAF. Peplinski, A.J. Anderson, R.A.; Mounts, T.L. St. Paul, Minn. : American Association of Cereal Chemists. Cereal chemistry. May/June 1990. v. 67 (3). p. 232-236. Includes references. (NAL Call No.: DNAL 59.8 C33).

# FOOD STORAGE

1576

Moisture content, invasion by *Aspergillus glaucus*, and germ discoloration in blends of corn of different initial moisture contents.  
PLDIDE. Christensen, C.M. MN; Meronuck, R.A.; Sauer, D.B. St. Paul, Minn. : American Phytopathological Society. Plant disease. Dec 1990. v. 74 (12). p. 985-988. Includes references. (NAL Call No.: DNAL 1.9 P69P).

# FOOD STORAGE, FIELD CROP

1577

## Dust suppression results with mineral oil applications for corn and milo.

TAAEA. Wardlaw, H.D. Jr. Parnell, C.B.; Lesikar, B.J. St. Joseph, Mich. : American Society of Agricultural Engineers. Transactions of the ASAE. Sept/Oct 1989. v. 32 (5). p. 1720-1726. Includes references. (NAL Call No.: DNAL 290.9 AM32T).

1578

## Effect of humidity ratio on corn moisture content as determined by the air-oven.

TAAEA. Balascio, C.C. Bern, C.J.; Hurlburgh, C.R. Jr. St. Joseph, Mich. : American Society of Agricultural Engineers. Transactions of the ASAE. Sept/Oct 1989. v. 32 (5). p. 1715-1719. ill. Includes references. (NAL Call No.: DNAL 290.9 AM32T).

1579

## Thermic properties of grains--production of heat and CO<sub>2</sub>.

Srour, S. New York, N.Y. : Lavoisier Pub., c1988. Preservation and storage of grains, seeds, and their by-products : cereals, oilseeds, pulses, and animal feed / edited by J.L. Multon ; preface by A.M. Reimbert ; translated from French by D. Marsh ; reread by A.J. Eydt. p. 189-202. Includes references. (NAL Call No.: DNAL SB190.C6513).

# FOOD CONTAMINATION AND TOXICOLOGY

1580

**Effect of C6 to C9 alkenals on aflatoxin production in corn, cottonseed, and peanuts.**  
APMBA. Zeringue, H.J. Jr. Washington, D.C. : American Society for Microbiology. The effect on aflatoxin production in *Aspergillus flavus*-inoculated corn, cottonseed, and peanuts in static culture in the presence of gaseous phase C6 to C9 alkenals was investigated. Aflatoxin B<sub>1</sub> production was stimulated in corn at the lowest alkenal concentration (1-microliter level) tested. Aflatoxin B<sub>1</sub> was completely eliminated at the highest alkenal concentrations (20-microliter level) tested in both treated corn and cottonseed cultures. Applied and environmental microbiology. Aug 1991. v. 57 (8). p. 2433-2434. Includes references. (NAL Call No.: DNAL 448.3 AP5).

produce fumonisins in culture. The test results indicate that the potential exists for production of fumonisins by such strains in agricultural commodities and other substrates in widespread geographic areas. Applied and environmental microbiology. Aug 1991. v. 57 (8). p. 2410-2412. Includes references. (NAL Call No.: DNAL 448.3 AP5).

1581

**Effect of temperature, relative humidity, and suspending menstrua on the resistance of *Listeria monocytogenes* to drying.**  
JFPRDR. Palumbo, S.A. Williams, A.C. Ames, Iowa : International Association of Milk, Food, and Environmental Sanitarians. The ability of *Listeria monocytogenes* to survive dehydrated storage at different temperatures (5 vs. 25 degrees C) and relative humidities (75, 59, 35, 14, and 1%) when suspended in different menstrua was studied. *L. monocytogenes* survived longer when held at 5 degrees C compared to 25 degrees C, and when suspended in beef extract, glycerol, Karo syrup, skim milk, and canned milk compared to distilled water. The contribution of relative humidity to survival was less clear, though survival tended to be longer at the lower relative humidities. At 5 degrees C when suspended in beef extract and held at relative humidities of 59% and below, there was less than a 2 log<sub>10</sub> decline in the viable population (starting count ca. 10<sup>5</sup>/coverslip). *L. monocytogenes* was not injured during drying or storage at the various relative humidities. In addition, based on the *Listeria* selective media evaluated, these *Listeria* media permitted quantitative recovery of the organism dried on surfaces. These results suggested that once *L. monocytogenes* has contaminated a food processing plant, it can persist for long periods in the plant environment if the temperature is low and the organism is protected by various food components. Journal of food protection. May 1990. v. 53 (5). p. 377-381. Includes references. (NAL Call No.: DNAL 44.8 J824).

1582

**Production of fumonisins by *Fusarium moniliforme* strains from various substrates and geographic areas.**  
APMBA. Nelson, P.E. Plattner, R.D.; Shackelford, D.D.; Desjardins, A.E. Washington, D.C. : American Society for Microbiology. Strains of *Fusarium moniliforme* from different geographic areas and from corn and other substrates were tested for the ability to

# FOOD CONTAMINATION, FIELD CROP

1583

## Aflatoxin contamination in maize and its biocontrol.

Zuber, M.S. Lillehoj, E.B. Boca Raton, Fla. : CRC Press, 1988. Biocontrol of plant diseases / editors, K.G. Mukerji, K.L. Garg. Literature review. v. 2 p. 85-102. Includes references. (NAL Call No.: DNAL SB732.6.B56).

1587

## Distribution and measurement of aflatoxin in 1983 Iowa corn.

CECHAF. Schmitt; S.G. Hurburgh, C.R. Jr. St. Paul, Minn. : American Association of Cereal Chemists. Cereal chemistry. May/June 1989. v. 66 (3). p. 165-168. maps. Includes references. (NAL Call No.: DNAL 59.8 C33).

1584

## Aflatoxin in midwestern corn.

IWRBB. Hurburgh, C.R. Jr. Ames, Iowa : The Station. Research bulletin - Iowa State University, Agricultural and Home Economics Experiment Station. June 1991. (599). p. 343-350. Includes references. (NAL Call No.: DNAL 100 I09).

1588

## Evaluation of maize populations of broad genetic base for aflatoxin contamination in the field.

Kang, M.S. Lillehoj, E.B.; Widstrom, N.W.; Cleveland, T.E. Baton Rouge, La. : The Department. Report of projects - Louisiana Agricultural Experiment Station, Department of Agronomy. 1988. p. 92-95. Includes references. (NAL Call No.: DNAL 100 L936).

1585

## Aflatoxin in Georgia: factors associated with its formation in corn.

IWRBB. McMillian, W.W. Widstrom, N.W.; Beaver, R.W.; Wilson, D.M. Ames, Iowa : The Station. Research bulletin - Iowa State University, Agricultural and Home Economics Experiment Station. June 1991. (599). p. 329-344. Includes references. (NAL Call No.: DNAL 100 I09).

1589

## Inhibition of 3H-leucine incorporation by trichothecene mycotoxins in maize and wheat tissue.

PHYTAJ. Casale, W.L. Hart, L.P. St. Paul, Minn. : American Phytopathological Society. The trichothecenes, deoxynivalenol (DON, vomitoxin) and T-2 toxin, inhibited 3H-leucine incorporation into acetone; ethanol insoluble material by maize and wheat tissue (leaf disks and kernel sections). These compounds are known to inhibit protein synthesis in animals and yeast. The toxin concentrations that gave ID50 (50% reduction) for 3H-leucine incorporation by several maize varieties were 0.9 microM T-2 toxin and 9-22 microM DON. ID50 values for wheat were 0.26 microM T-2 toxin and 4.5 microM DON. T-2 toxin gave near-maximum inhibition in leaf tissue within 5 min after exposure to the toxin. T-2 toxin or its effects on 3H-leucine incorporation persisted at least 120 min after removal of leaf disks from toxin solutions. Sensitivity to DON was not correlated with susceptibility to ear rot by a DON-producing strain of Gibberella zaeae (anamorph = Fusarium graminearum) for six maize lines with a range of disease reactions from highly susceptible to highly resistant. However, the ID50 for one moderately resistant line (A509) was 2.3 times greater than the ID50 of the most susceptible line (B79). 3H-Leucine incorporation by wheat and maize was inhibited by DON and T-2 toxin at concentrations occurring in naturally infected tissue, suggesting the need for further evaluation of these compounds as plant disease determinants. Phytopathology. Dec 1988. v. 78 (12,pt.2). p. 1673-1677. Includes references. (NAL Call No.: DNAL 464.8 P56).

1586

## Development of the granary weevil (Coleoptera: Curculionidae) on barley, corn, oats, rice and wheat.

JEENAI. Schwartz, B.E. Burkholder, W.E. Lanham, Md. : Entomological Society of America. Granary weevil, *Sitophilus granarius* (L.), development from egg to adult emergence on barley, corn, oats, rice, and wheat was examined at 27.5 degrees C and 75% RH. Development was slowest on corn and fastest on rice. No differences in developmental duration were observed among barley, oats, and wheat. Progeny production was highest on barley and wheat, followed by (in descending order) corn, rice, and oats. Granary weevil development from egg to adult emergence on corn was examined at 15, 20, 25, 30, and 35 degrees C, and 43, 58, or 75% RH. Development was slowest at 15 degrees C and fastest at 30 degrees C. Development was slowest at 43% RH. Few weevils emerged at 43% RH, and only one weevil emerged at 35 degrees C and 75% RH. Granary weevil development from egg to adult emergence on barley was examined at 15, 20, 25, 27.5, and 30 degrees C, and 43, 58, or 75% RH. Development was slowest at 15 degrees C for all RH values and at 43% RH for all temperatures. Journal of economic entomology. June 1991. v. 84 (3). p. 1047-1052. Includes references. (NAL Call No.: DNAL 421 J822).

(FOOD CONTAMINATION, FIELD CROP)

1590

**Inhibition radioimmunoassay for *Aspergillus repens* compared with other indices of fungal growth in stored corn.**

CECHAF. Martin, S.L. Tuite, J.; Diekman, M.A. St. Paul, Minn. : American Association of Cereal Chemists. Cereal chemistry. May/June 1989. v. 66 (3). p. 139-144. Includes references. (NAL Call No.: DNAL 59.8 C33).

1594

**Some effects of mineral nutrition on aflatoxin contamination of corn and peanuts.**

Wilson, D.M. Walker, M.E.; Gascho, G.J. St. Paul, Minn. : APS Press, c1989. Soilborne plant pathogens : management of diseases with macro- and microelements / edited by Arthur W. Engelhard. p. 137-151. Includes references. (NAL Call No.: DNAL SB732.87.S66).

1591

**Moisture content, invasion by *Aspergillus glaucus*, and germ discoloration in blends of corn of different initial moisture contents.**

PLDIDE. Christensen, C.M. MN; Meronuck, R.A.; Sauer, D.B. St. Paul, Minn. : American Phytopathological Society. Plant disease. Dec 1990. v. 74 (12). p. 985-988. Includes references. (NAL Call No.: DNAL 1.9 P69P).

1592

**Mycotoxin formation by *Aspergillus flavus* and *Fusarium graminearum* in irradiated maize grains in the presence of other fungi.**

JFPRDR. Cuero, R. Smith, J.E.; Lacey, J. Ames, Iowa : International Association of Milk, Food, and Environmental Sanitarians. Journal of food protection. June 1988. v. 51 (6). p. 452-456. Includes references. (NAL Call No.: DNAL 44.8 J824).

1593

**Reduction in aflatoxin content of maize by atoxigenic strains of *Aspergillus flavus*.**

JFPRDR. Brown, R.L. Cotty, P.J.; Cleveland, T.E. Ames, Iowa : International Association of Milk, Food, and Environmental Sanitarians. In field plot experiments, an atoxigenic strain of *Aspergillus flavus* interfered with preharvest aflatoxin contamination of corn when applied either simultaneously with or one day prior to a toxigenic strain. The atoxigenic strain reduced preharvest aflatoxin contamination 80 to 95%. The atoxigenic strain was also effective in reducing postharvest aflatoxin contamination caused by both an introduced toxigenic strain and by strains resident on the kernels. The results suggest that atoxigenic strains of *A. flavus* may have potential use as biological control agents directed at reducing both preharvest and postharvest aflatoxin contamination of corn. Journal of food protection. Aug 1991. v. 54 (8). p. 623-626. Includes references. (NAL Call No.: DNAL 44.8 J824).

# FOOD CONTAMINATION, HORTICULTURAL CROP

1595

Aflatoxin in maize.

Payne, G.A. Boca Raton, Fla. : CRC Press.  
Critical reviews in plant sciences. Literature  
review. 1992. v. 10 (5). p. 423-440. Includes  
references. (NAL Call No.: DNAL QK1.C83).

# FOOD COMPOSITION, FIELD CROP

1596

**Diffusion coefficient for corn drying.**  
TAAEA. Parti, M. Dugmanics, I. St. Joseph,  
Mich. : American Society of Agricultural  
Engineers. Recently, diffusion theory has been  
increasingly applied to describe the drying of  
agricultural grain. This requires a knowledge  
of the diffusion coefficient as a function of  
temperature and moisture content. Based on  
published data, a relationship was developed  
for the diffusion coefficient of corn.  
Comparisons with experiments show that the  
diffusion equation more exactly fits the drying  
curve than do some well-known, semi-empirical  
relationships. However, it should be stated  
that the semi-empirical models can give  
reasonable results for practice. Transactions  
of the ASAE. Sept/Oct 1990. v. 33 (5). p.  
1652-1656. Includes references. (NAL Call No.:  
DNAL 290.9 AM32T).

1597

**Image analysis and characterization of cereal  
grains with a laser range finder and camera  
contour extractor.**  
CECHAF. Chen, C. Chiang, Y.P.; Pomeranz, Y. St.  
Paul, Minn. : American Association of Cereal  
Chemists. Cereal chemistry. Nov/Dec 1989. v. 66  
(6). p. 466-470. ill. Includes references. (NAL  
Call No.: DNAL 59.8 C33).

1598

**Surface oil application effects on chemical,  
physical, and dry-milling properties of corn.**  
CECHAF. Peplinski, A.J. Anderson, R.A.; Mounts,  
T.L. St. Paul, Minn. : American Association of  
Cereal Chemists. Cereal chemistry. May/June  
1990. v. 67 (3). p. 232-236. Includes  
references. (NAL Call No.: DNAL 59.8 C33).

# FEED PROCESSING AND STORAGE

1599

## Breakage susceptibility of corn kernels in relation to crop management under long growing season conditions.

AGJOAT. Vyn, T.J. Moes, J. Madison, Wis. : American Society of Agronomy. Corn (*Zea mays L.*) kernels are subject to breakage during postharvest handling. Manipulation of crop management factors has influenced kernel breakage susceptibility, but the effects of hybrid, plant density, harvest moisture content, and drying temperature on breakage susceptibility have not been studied under long growing season conditions. Field experiments were conducted in 1985 and 1986 at Ridgetown, Ontario. Five commercial hybrids were grown at different plant densities (5.5 and 7.0 plant m<sup>-2</sup> in both years, and 6.3 plants m<sup>-2</sup> in 1985), harvested at 300 and 240 g kg<sup>-1</sup> moisture content (wet basis), and dried at different air temperatures (20, 40, and 80 degrees C in 1985; 20 and 100 degrees C in 1986) to approximately 150 g kg<sup>-1</sup> moisture content. A Wisconsin breakage tester was used to measure breakage susceptibility. Small increases in breakage were consistently associated with increased plant densities. Reductions in breakage were sometimes associated with lower grain moisture content at harvest. The largest and most consistent changes in breakage susceptibility were due to changes in drying temperatures. Increased drying temperatures resulted in increased breakage, but there was variation among the hybrids in the size of the response. The results indicate that breakage susceptibility is an inherited trait that is also influenced by crop management. Kernel breakage can be reduced by proper choice of hybrids, drying in low air temperature, and harvesting at low grain moisture content. In both years, increased breakage susceptibility was related to higher levels of endosperm stress cracks, tendency towards roundness in shape, and increased levels of harvest damage in the form of visible chips or cracks. Agronomy journal. Nov/Dec 1988. v. 80 (6). p. 915-920. Includes references. (NAL Call No.: DNAL 4 AM34P).

1600

## Breakage susceptibility of rewetted and blended corn samples.

TAAEA. Wu, P.C. Eckhoff, S.R.; Chung, D.S.; Converse, H.H. St. Joseph, Mich. : American Society of Agricultural Engineers. Transactions of the ASAE. Sept/Oct 1988. v. 31 (5). p. 1581-1584. Includes references. (NAL Call No.: DNAL 290.9 AM32T).

1601

## Diffusion coefficient for corn drying.

TAAEA. Parti, M. Dugmanics, I. St. Joseph, Mich. : American Society of Agricultural Engineers. Recently, diffusion theory has been increasingly applied to describe the drying of agricultural grain. This requires a knowledge of the diffusion coefficient as a function of

temperature and moisture content. Based on published data, a relationship was developed for the diffusion coefficient of corn. Comparisons with experiments show that the diffusion equation more exactly fits the drying curve than do some well-known, semi-empirical relationships. However, it should be stated that the semi-empirical models can give reasonable results for practice. Transactions of the ASAE. Sept/Oct 1990. v. 33 (5). p. 1652-1656. Includes references. (NAL Call No.: DNAL 290.9 AM32T).

1602

## Inhibition of mold growth and aflatoxin production by *Lactobacillus* spp.

JFPRDR. Karunaratne, A. Wezenberg, E.; Bullerman, L.B. Ames, Iowa : International Association of Milk, Food, and Environmental Sanitarians. The effect of three individual species of lactobacilli (*Lactobacillus acidophilus*, *L. bulgaricus*, and *L. plantarum*) and a commercial silage inoculant, containing three different strains of the same species, on growth and aflatoxin production of *A. flavus* subsp. *parasiticus* NRRL 2999 was determined. The study was done in three substrates; a liquid semi-synthetic broth, rice, and corn. The effect of the growing cell masses of the lactobacilli as well as the effect of metabolic products contained in cell free filtrates were determined in the liquid medium. The cells were effective in preventing growth of the mold, and bacterial metabolites were effective in reducing the amount of aflatoxin produced, although growth was not affected. The prevention of growth that was observed was determined to be relative to a pH effect and microbial competition; however, the lower levels of aflatoxin obtained in the presence of cell free supernatant culture fluids could not be explained on the basis of pH or competition. Mold growth was not affected by the presence of the silage inoculant on the rice and corn. However, increased levels of aflatoxin B1 were observed in the presence of the silage inoculant on rice, and decreased levels of aflatoxin G1 were observed on the presence of the silage inoculant on corn. Journal of food protection. Mar 1990. v. 53 (3). p. 230-236. Includes references. (NAL Call No.: DNAL 44.8 J824).

1603

## Magnitude and sources of error in Wisconsin Breakage Tester results.

TAAEA. Eckhoff, S.R. Wu, P.C.; Chung, D.S.; Converse, H.H. St. Joseph, Mich. : American Society of Agricultural Engineers. Transactions of the ASAE. July/Aug 1988. v. 31 (no.4). p. 1247-1250. illl. Includes references. (NAL Call No.: DNAL 290.9 AM32T).

(FEED PROCESSING AND STORAGE)

1604

**Moisture content and temperature effects on Wisconsin Breakage Tester results.**

TAAEA. Eckhoff, S.R. Wu, P.C.; Chung, D.S.; Converse, H.H. St. Joseph, Mich. : American Society of Agricultural Engineers. Transactions of the ASAE. July/Aug 1988. v. 31 (no.4). p. 1241-1246. Includes references. (NAL Call No.: DNAL 290.9 AM32T).

1605

**Sodium bicarbonate inhibition of aflatoxigenesis in corn.**

JFPRDR. Montville, T.J. Goldstein, P.K. Ames, Iowa : International Association of Milk, Food, and Environmental Sanitarians. This study sought to determine if the ability of sodium bicarbonate and ammonium bicarbonate to inhibit aflatoxigenesis in microbiological media could be extended to corn systems. A method for applying bicarbonates evenly to corn was developed. Aflatoxin levels of sodium bicarbonate-treated (0.17% wt/wt) corn were reduced to one-third those of untreated corn when both were inoculated with *Aspergillus parasiticus* spores and incubated at 30 degrees C for three weeks. While both sodium and ammonium bicarbonate reduced the amount of fungal growth, only sodium bicarbonate reduced aflatoxin production. Journal of food protection. Jan 1989. v. 52 (1). p. 45-48. Includes references. (NAL Call No.: DNAL 44.8 J824).

# FEED CONTAMINATION TOXICOLOGY

1606

## Aflatoxin contamination in maize and its biocontrol.

Zuber, M.S. Lillehoj, E.B. Boca Raton, Fla. : CRC Press, 1988. Biocontrol of plant diseases / editors, K.G. Mukerji, K.L. Garg. Literature review. v. 2 p. 85-102. Includes references. (NAL Call No.: DNAL SB732.6.B56).

1607

## Aflatoxin in midwestern corn.

IWRBB. Hurlburgh, C.R. Jr. Ames, Iowa : The Station. Research bulletin - Iowa State University, Agricultural and Home Economics Experiment Station. June 1991. (599). p. 343-350. Includes references. (NAL Call No.: DNAL 100 I09).

1608

## Aflatoxin in Georgia: factors associated with its formation in corn.

IWRBB. McMillian, W.W. Widstrom, N.W.; Beaver, R.W.; Wilson, D.M. Ames, Iowa : The Station. Research bulletin - Iowa State University, Agricultural and Home Economics Experiment Station. June 1991. (599). p. 329-344. Includes references. (NAL Call No.: DNAL 100 I09).

1609

## Development of the granary weevil (Coleoptera: Curculionidae) on barley, corn, oats, rice and wheat.

JEENAI. Schwartz, B.E. Burkholder, W.E. Lanham, Md. : Entomological Society of America. Granary weevil, *Sitophilus granarius* (L.), development from egg to adult emergence on barley, corn, oats, rice, and wheat was examined at 27.5 degrees C and 75% RH. Development was slowest on corn and fastest on rice. No differences in developmental duration were observed among barley, oats, and wheat. Progeny production was highest on barley and wheat, followed by (in descending order) corn, rice, and oats. Granary weevil development from egg to adult emergence on corn was examined at 15, 20, 25, 30, and 35 degrees C, and 43, 58, or 75% RH. Development was slowest at 15 degrees C and fastest at 30 degrees C. Development was slowest at 43% RH. Few weevils emerged at 43% RH, and only one weevil emerged at 35 degrees C and 75% RH. Granary weevil development from egg to adult emergence on barley was examined at 15, 20, 25, 27.5, and 30 degrees C, and 43, 58, or 75% RH. Development was slowest at 15 degrees C for all RH values and at 43% RH for all temperatures. Journal of economic entomology. June 1991. v. 84 (3). p. i047-i052. Includes references. (NAL Call No.: DNAL 421 J822).

1610

## Inhibition of mold growth and aflatoxin production by *Lactobacillus* spp.

JFPRDR. Karunaratne, A. Wezenberg, E.; Bullerman, L.B. Ames, Iowa : International Association of Milk, Food, and Environmental Sanitarians. The effect of three individual species of *Lactobacilli* (*Lactobacillus acidophilus*, *L. bulgaricus*, and *L. plantarum*) and a commercial silage inoculant, containing three different strains of the same species, on growth and aflatoxin production of *A. flavus* subsp. *parasiticus* NRRL 2999 was determined. The study was done in three substrates; a liquid semi-synthetic broth, rice, and corn. The effect of the growing cell masses of the *Lactobacilli* as well as the effect of metabolic products contained in cell free filtrates were determined in the liquid medium. The cells were effective in preventing growth of the mold, and bacterial metabolites were effective in reducing the amount of aflatoxin produced, although growth was not affected. The prevention of growth that was observed was determined to be relative to a pH effect and microbial competition; however, the lower levels of aflatoxin obtained in the presence of cell free supernatant culture fluids could not be explained on the basis of pH or competition. Mold growth was not affected by the presence of the silage inoculant on the rice and corn. However, increased levels of aflatoxin B1 were observed in the presence of the silage inoculant on rice, and decreased levels of aflatoxin G1 were observed on the presence of the silage inoculant on corn. Journal of food protection. Mar 1990. v. 53 (3). p. 230-236. Includes references. (NAL Call No.: DNAL 44.8 J824).

1611

## Sodium bicarbonate inhibition of aflatoxigenesis in corn.

JFPRDR. Montville, T.J. Goldstein, P.K. Ames, Iowa : International Association of Milk, Food, and Environmental Sanitarians. This study sought to determine if the ability of sodium bicarbonate and ammonium bicarbonate to inhibit aflatoxigenesis in microbiological media could be extended to corn systems. A method for applying bicarbonates evenly to corn was developed. Aflatoxin levels of sodium bicarbonate-treated (0.17% wt/wt) corn were reduced to one-third those of untreated corn when both were inoculated with *Aspergillus parasiticus* spores and incubated at 30 degrees C for three weeks. While both sodium and ammonium bicarbonate reduced the amount of fungal growth, only sodium bicarbonate reduced aflatoxin production. Journal of food protection. Jan 1989. v. 52 (1). p. 45-48. Includes references. (NAL Call No.: DNAL 44.8 J824).

# FEED COMPOSITION

1612

**Corn and sorghum breeding and management.**  
AKFRAC. York, J.O. Fayetteville, Ark. : The  
Station. Arkansas farm research - Arkansas  
Agricultural Experiment Station. Jan/Feb 1989.  
v. 38 (1). p. 6. (NAL Call No.: DNAL 100  
AR42F).

1613

**Yield and quality of forage maize as influenced by hybrid, planting date, and plant density.**  
AGJOAT. Graybill, J.S. Cox, W.J.; Otis, D.J.  
Madison, Wis. : American Society of Agronomy.  
Although forage maize (*Zea mays L.*) is grown extensively on livestock operations, most management studies in the USA focus on grain production. Field studies were conducted in New York to evaluate dry matter (DM) yield and forage quality responses of commercial hybrids to planting dates and densities. Six hybrids were planted on 25 April, 9 May, and 23 May and thinned to 5.0, 6.5, and 8.0 plants m<sup>-2</sup> in 1988 and 1989. A significant year X planting date interaction was observed for DM yield because dry early-season conditions in 1988 negated the advantage of early planting in northern latitudes (13.4, 13.9, and 14.6 Mg ha<sup>-1</sup> for planting dates 25 April, 9 May, and 23 May, respectively). When averaged across years, high plant densities increased DM yields (15.7, 16.5, and 17.5 Mg ha<sup>-1</sup> at 5.0, 6.5, and 8.0 plants m<sup>-2</sup> respectively) with no significant effect on harvest index (524, 523, and 526 g kg<sup>-1</sup> at 5.0, 6.5, and 8.0 plants m<sup>-2</sup>, respectively). A hybrid X density interaction was observed for DM yield that suggests that some hybrids in this study performed better at higher densities. Plant density had little effect on acid detergent fiber (ADF) and neutral detergent fiber (NDF) concentrations indicating that forage quality can be maintained at high densities. Hybrids showed distinct variation for ADF (186-217 g kg<sup>-1</sup>), NDF (414-434 g kg<sup>-1</sup>), and crude protein (CP) (72-77 g kg<sup>-1</sup>) concentrations. The forage quality differences among hybrids may be of sufficient magnitude to be of value to the forage producer. Agronomy journal. May/June 1991. v. 83 (3). p. 559-564. Includes references. (NAL Call No.: DNAL 4 AM34P).

# POLLUTION

1614

**Atrazine metabolite behavior in soil-core microcosms: Formation, disappearance, and bound residues.**

ACSMC. Winkelmann, D.A. Klaine, S.J. Washington, D.C. : The Society. ACS Symposium series - American Chemical Society. In the series analytic: Pesticide Transformation Products: Fate and significance in the environment / edited by L. Somasundaram and J.R. Coats. ~ Literature review. 1991. (459). p. 75-92. Includes references. (NAL Call No.: DNAL QD1.A45).

QH540.J6).

1615

**Degradation of terbufos in soils during drought conditions.**

Cobb, G.P. Brewer, L.W.; Kendall, R.U. Blacksburg : Virginia Water Resources Research Center, VPI and State University, 1989. Pesticides in terrestrial and aquatic environments : proceedings of a national research conference, May 11-12, 1989 / edited by Diana L. Weigmann. p. 159-170. Includes references. (NAL Call No.: DNAL QH545.P4P4844).

1616

**Direct effects of simulated acid rain on sexual reproduction in corn.**

JEVQAA. DuBay, D.T. Madison, Wis. : American Society of Agronomy. The process of sexual reproduction in flowering plants often exposes pollen grains to the environment and the potential effects of atmospheric deposition. Experiments were designed to determine whether simulated acid rain treatments just before or after pollination could adversely influence reproductive processes and seed set in corn (*Zea mays* L.). Container-grown corn with sexually mature tassels and ears were exposed once to simulated rain at four pH levels for 1 h, beginning 1 h after artificial pollination or ending 10 min before artificial pollination. The single, artificial pollination deposited an average of 85 pollen grains per silk. Simulated rain treatment at pH 4.5, 3.5, or 2.5 after pollination reduced the percentage seed set of treated ears 7, 29, and 34%, respectively, as compared with pH 5.5. Simulated rain at pH 5.5 after pollination reduced seed set 24% as compared with no-rain controls. The pH of simulated rain applied before pollination did not affect seed set, and pH 5.5 rain applied before pollination had no effects on seed set compared to no-rain controls. Microscopic observations indicated that pollen germination and pollen tube penetration of the silk were completed by the time the rain treatments began 1 h after pollination. This infers that simulated acid rain influenced pollen tubes after they entered the silks. These results suggest that plant sexual reproduction could be adversely affected by acidic precipitation at pH levels observed for rain events in eastern North America. Journal of environmental quality. Apr/June 1989. v. 18 (2). p. 217-221. Includes references. (NAL Call No.: DNAL

1617

**Effects of simulated acidic precipitation on plant-insect interactions in agricultural systems: corn and black cutworm larvae.**

JEVQAA. Stinner, D.H. Stinner, B.R.; McCartney, D.A. Madison, Wis. : American Society of Agronomy. Effects of simulated acidic precipitation on food utilization, growth, development, and herbivory of black cutworms (*Agrotis ipsilon*) on corn (*Zea mays* L.) in the most economically important life-history combinations of plant and insect were investigated in a series of laboratory and greenhouse experiments. A nutritional-index technique was used in petri-dish experiments with fourth, fifth, and sixth instar black cutworms to determine if acid precipitation could affect the amount of food consumed via affects on insect physiological parameters. Larvae were fed corn plants that were watered two times weekly with simulated precipitation (pH 2.8, 4.2, and 5.6) until the larvae pupated (total deposition of 8-10 cm of precipitation). The inverse relationship between the index of approximate digestibility (AD), which was higher in the pH 2.8 and 5.6 treatments, and the efficiency of conversion of digested food indices (ECD), which was lowest in the pH 2.8 treatment, suggested a stress effect of high acidity. A series of six greenhouse pot experiments was conducted to assess effects of acid precipitation on black cutworms and their interactions with growing corn plants. Fourth, fifth, and sixth instar larvae were placed in pots containing soil and corn plants, which were initially in the first or second leaf stage, and simulated acid precipitation (pH 2.8, 4.2, and 5.6) was applied two times per week until the larvae pupated (8-16 cm total deposition). Significant treatment effects were observed in the sixth instar larvae on two-leaf corn experiment, where the larvae grew larger and developed faster in the pH 2.8 and 4.2 treatments than in the 5.6 treatment. Acid precipitation treatments did not significantly affect black cutworm damage to corn plants in any of these experiments. Journal of environmental quality. July/Sept 1988. v. 17 (3). p. 371-376. Includes references. (NAL Call No.: DNAL QH540.J6).

1618

**Field corn: managing pesticides for crop production and water quality protection--a supplement to the IFAS pest control guides.**

Hornsby, A.G. Buttler, T.M.; Colvin, D.L.; Sprenkel, R.E.; Dunn, R.A.; Kucharek, T.A. Gainesville, Fla. : The Service. Circular - Florida Cooperative Extension Service. In subseries: Water Quality Initiative Series. May 1991. (982). 10 p. (NAL Call No.: DNAL 275.29 F66C).

## (POLLUTION)

1619

**Formation and transport of deethylatrazine in the soil and vadose zone.**  
JEVQAA. Adams, C.D. Thurman, E.M. Madison, Wis. : American Society of Agronomy. Atrazine 2-chloro-4-ethylamino-6-isopropylamino-s-triazine) and two degradation products were monitored at seven depths in the soil and vadose zone throughout the growing season in two experimental plots in which corn (*Zea mays* L.) was grown. The soils in these plots were a Kimo silty clay loam (clayey over loamy, montmorillonitic, mesic, Fluvaquentic Hapludoll) and a Eudora silt loam (coarse, silty, mixed, mesic, Fluventic Hapludoll). The purpose of this field study was to identify and quantify the mobile and persistent degradation products of atrazine that comprise the input, or "source term," to groundwater resulting from the application of atrazine to the soils. The formation of deethylatrazine (2-amino-4-chloro-6-isopropylamino-s-triazine) and deisopropylatrazine (2-amino-4-chloro-6-ethylamino-s-triazine) was monitored at various depths using suction lysimeters to determine the relative proportions at which these compounds enter the aquifer. Deethylatrazine was the major degradation product of atrazine identified in the soil water and appeared to enter the underlying aquifer at a concentration of 5.0 microgram/L, which was greater than the concentration of atrazine entering the aquifer. Deisopropylatrazine also was detected in the soil water, but only in minor concentrations relative to atrazine and deethylatrazine. Because deethylatrazine was the major degradation product in the unsaturated zone, the deethylatrazine-to-atrazine ratio (DAR) may be a good indicator of transport of atrazine through the soil. The hypothesis is proposed that the DAR may be used to distinguish point-source from nonpoint-source contamination of an aquifer. Journal of environmental quality. July/Sept 1991. v. 20 (3). p. 540-547. Includes references. (NAL Call No.: DNAL QH540.J6).

1620

**Herbicides in surface waters of the midwestern United States: the effect of spring flush.**  
ESTHAG. Thurman, E.M. Goolsby, D.A.; Meyer, M.T.; Kolpin, D.W. Washington, D.C. : American Chemical Society. Environmental science & technology. Oct 1991. v. 25 (10). p. 1794-1796. Includes references. (NAL Call No.: DNAL TD420.A1E5).

1621

**Managing pesticides on corn to avoid contaminating water.**  
Renner, K.A. Olsen, L.G.; Landis, J.N. East Lansing, Mich. : The Service. Extension bulletin : Water quality series. May 1991. (26, major rev.). 2 p. (NAL Call No.: DNAL TD224.M5E97).

1622

**Nitrogen management in a corn soybean rotation.**  
SDABA. Gerwing, J. Gelderman, R.; Sorenson, D. Brookings, S.D. : The Station. TB - Agricultural Experiment Station, South Dakota State University. 1991. (97). 5 p. (soil PR 90-27). (NAL Call No.: DNAL 100 S082 (3)).

1623

**Nitrogen management related to groundwater quality in Minnesota.**  
JMNAA. Anderson, J.L. Malzer, G.L.; Randall, G.W.; Rehm, G.W. St. Paul, Minn. : The Academy. Journal of the Minnesota Academy of Science. Fall 1989. v. 55 (1). p. 53-57. maps. Includes references. (NAL Call No.: DNAL 500 M663).

1624

**Ozone-metolachlor interactions on corn (*Zea mays*), bean (*Phaseolus vulgaris*), and soybean (*Glycine max*).**

WETEE9. Mersie, W. Mebrahtu, T.; Rangappa, M. Champaign, Ill. : The Society. Weed technology : a journal of the Weed Science Society of America. Oct/Dec 1989. v. 3 (4). p. 650-653. Includes references. (NAL Call No.: DNAL SB610.W39).

1625

**Persistence and degradation of PP993 pyrethroid, fonofos, and chlorpyrifos in a Quebec cornfield's soil.**

BECTA6. Elhag, F.A. Yule, W.N.; Marshall, W.D. New York, N.Y. : Springer-Verlag. Bulletin of environmental contamination and toxicology. Feb 1989. v. 42 (2). p. 172-176. Includes references. (NAL Call No.: DNAL RA1270.P35A1).

1626

**Pesticide movement in a coastal plain soil under irrigation.**

Ritter, W.F. Chirnside, A.E.M.; Scarborough, R.W. Denver, Colo. : U.S. Committee on Irrigation and Drainage, c1989. Toxic substances in agricultural water supply and drainage : an int environ perspective : papers from the Second Pan-American Regional Conf of the Int Commission on Irrigation and Drainage, Ottawa, Canada, June 8-9, 1989. p. 389-400. Includes references. (NAL Call No.: DNAL TD428.A37T695 1989).

1627

**Probabilistic cost effectiveness in agricultural nonpoint pollution control.**

McSweeney, W.T. Shortle, J.S. Experiment, Ga. : The Association. Conceptual weaknesses in the use of costs of average abatement as a measure of the cost effectiveness of agricultural nonpoint pollution control are examined. A probabilistic alternative is developed. The focus is on methods for evaluating whole-farm pollution control plans rather than individual practices. As a consequence, the analysis is presented in a chance-constrained activity analysis framework because activity analysis procedures are a practical and well developed device for screening farm plans. Reliability of control is shown to be as important as reduction targets in designing farm plans for pollution control. Furthermore, broad-axe prescriptions of technology in the form of Best Management Practices may perform poorly with respect to cost effectiveness. Southern journal of agricultural economics - Southern Agricultural Economics Association. July 1990. v. 22 (1). p. 95-104. Includes references. (NAL Call No.: DNAL HD101.S6).

1628

**Preferential movement of pesticides and tracers in agricultural soils.**

JIDEDH. Steenhuis, T.S. Staubitz, W.; Andreini, M.S.; Surface, J.; Richard, T.L.; Paulsen, R.; Pickering, N.B.; Hagerman, J.R.; Geohring, L.D. New York, N.Y. : American Society of Civil Engineers. Journal of irrigation and drainage engineering. Jan/Feb 1990. v. 116 (1). p. 50-66. illl. Includes references. (NAL Call No.: DNAL 290.9 AM3PS (IR)).

# MATHEMATICS AND STATISTICS

1629

## Biophysical simulation in support of crop production decisions: a case study in the Blacklands region of Texas.

Dillon, C.R. Mjelde, J.W.; McCarl, B.A. Experiment, Ga. : The Association. Economic feasibility of Texas Blacklands corn production in relation to sorghum, wheat, and cotton is studied. Biophysical simulation generated yield data are integrated with an economic decision model using quadratic programming. Given the various scenarios analyzed, corn is economically feasible for the Blacklands. A crop mix of half corn and half cotton production is selected under risk neutrality with wheat entering if risk aversion is present. Corn and grain sorghum production are highly substitutable. Profit effects attributed to changing corn planting dates are more pronounced than profit changes resulting from altering corn population or maturity class. Southern journal of agricultural economics - Southern Agricultural Economics Association. July 1989. v. 21 (1). p. 73-86. Includes references. (NAL Call No.: DNAL HD101.S6).

1630

## Corn and soybean yield trends: evidence from well managed farms.

JUPRAEN. Chicoine, D.L. Scott, J.T. Jr. Madison, Wis. : American Society of Agronomy. Journal of production agriculture. July/Sept 1988. v. 1 (3). p. 211-216. Includes references. (NAL Call No.: DNAL S539.5.J68).

1631

## Corn growth response to temperature: rate and duration of leaf emergence.

AGJOAT. Hesketh, J.D. Warrington, I.J. Madison, Wis. : American Society of Agronomy. Seasonal predictions of gas and energy exchange in crop canopies require a quantitative description of temperature effects on leaf area development. Such predictions are needed in crop management and forecasting models. Our objectives were to quantify temperature effects on leaf emergence rates, determined as lengths and areas of fully expanded emerged leaf material, and their duration in corn (*Zea mays L.*). Hybrids were grown in controlled environments under 16 temperature regimes ranging from 16/11 to 38/33 degrees C (12-h day/night thermal periods). Plants were dissected every 3 to 10 d, depending on the temperature, to determine the mainstem node number associated with the youngest leaf primordium as well as weight, area, and length per leaf. The node number of the youngest leaf showing a ligule was recorded. Leaf emergence rates, either as lengths or areas per unit time, and the node associated with the youngest visible leaf tip were derived from time plots of emerged leaf lengths and area. Emergence duration was estimated three ways: (i) the time between appropriate leaf developmental events, from time plots, (ii) mature leaf length divided by its extension rate, and (iii) mature leaf area

divided by its area emergence rate. Primordia and ligule appearance rates derived from these data were published earlier. The relationships between temperature and tip appearance rates, leaf emergence rates, and the reciprocals of the various estimates of duration were determined; threshold temperatures and degree day requirements for processes derived from such plots are presented. Other information is provided for developing logic for predicting temperature effects on the development of canopy leaf area in corn. Agronomy journal. July/Aug 1989. v. 81 (4). p. 696-701. Includes references. (NAL Call No.: DNAL 4 AM34P).

1632

## Development and growth of tropical maize at two elevations in Hawaii.

AGJOAT. Manrique, L.A. Hodges, T. Madison, Wis. : American Society of Agronomy. Development and growth response of maize (*Zea mays L.*) to an increase in temperature and daylength has been studied in temperate regions, but little is known of the effects of daylength on leaf number, leaf area development, and grain yield in tropical environments. A temperature-by-daylength experiment was conducted in the field on the Island of Maui, Hawaii (USA) at 282 and 640 m elevations during summer 1988 to examine the effects of daylength and temperature on leaf number, leaf area index (LAI), and grain yield of Pioneer hybrid X304C. Under high nutrient fertility and adequate water supply, plants were grown at natural daylength (12-13.5 h, control), control + 0.5-h, 14-, 17-, and 20-h daylengths. These daylengths were artificially produced by extending the natural daylength with 500-W lamps. For a 97-d period, mean maximum air temperatures were 26.8 and 27.8 degrees C while minimum air temperatures for the same period were 20.1 and 16.4 degrees C at the 282 and 640 m elevations, respectively. Longer days reduced mature leaf appearance rate and delayed tassel initiation and tasseling. Leaf tip appearance rate was unaffected by daylength but leaves took more thermal time for full expansion. Leaf area index in the 17- and 20-h daylengths was 7.0 at 77 d after planting, which was 1.8 times the LAI in the control and 14-h daylengths. Physiological maturity in the 17-h daylength was delayed by 33.5 and 38.5 d at 282 and 640 m, respectively. Maturity in the 20-h daylength was delayed by 41.0 and 48.5 d at 282 and 640 m, respectively. Grain yields and harvest indices at both elevations decreased significantly with increasing daylength. Overall, warm temperatures at 282 m enhanced the adverse effects of daylength on grain yield. Agronomy journal. Mar/Apr 1991. v. 83 (2). p. 305-310. Includes references. (NAL Call No.: DNAL 4 AM34P).

## (MATHEMATICS AND STATISTICS)

1633

### Diffusion coefficient for corn drying.

TAAEA. Parti, M. Dugmanics, I. St. Joseph, Mich. : American Society of Agricultural Engineers. Recently, diffusion theory has been increasingly applied to describe the drying of agricultural grain. This requires a knowledge of the diffusion coefficient as a function of temperature and moisture content. Based on published data, a relationship was developed for the diffusion coefficient of corn. Comparisons with experiments show that the diffusion equation more exactly fits the drying curve than do some well-known, semi-empirical relationships. However, it should be stated that the semi-empirical models can give reasonable results for practice. Transactions of the ASAE. Sept/Oct 1990. v. 33 (5). p. 1652-1656. Includes references. (NAL Call No.: DNAL 290.9 AM32T).

1634

**The economics of alternative tillage systems, crop rotations, and herbicide use on three representative East-Central Corn Belt farms.**  
WEESA6. Martin, M.A. Schreiber, M.M.; Riepe, J.R.; Bahr, J.R. Champaign, Ill. : Weed Science Society of America. A linear programming model was used to determine which crop rotations and weed management systems result in the highest net farm income for each of three farm sizes (120, 240, and 480 hectares) under alternative tillage systems. Test plot data for the years 1981 through 1988 from the Purdue University Agronomy Farm, which has highly productive, well-drained soils, were analyzed. Net incomes for no-till tillage systems on all farms in the model were consistently and significantly lower than incomes for moldboard and chisel plow tillage systems due to slightly lower yields and substantially higher herbicide costs. Generally, net farm incomes were slightly higher with a moldboard plow versus chisel plow tillage system. Also, as farm size increased, per hectare net incomes increased. About 80% of the time under moldboard or chisel plow tillage systems, the model chose as optimal the lowest of three herbicide application rates. A corn/soybean rotation was chosen as optimal on 56% of the farm area analyzed, versus 25% for continuous corn and 13% for a corn/soybean/wheat rotation. Weed science. Apr/June 1991. v. 39 (2). p. 299-307. Includes references. (NAL Call No.: DNAL 79.8 W4i).

1635

**Effects of hybrid and grain damage on estimated dry matter loss for high-moisture shelled corn.**  
TAAEA. Stroshine, R.L. Yang, X. St. Joseph, Mich. : American Society of Agricultural Engineers. An interactive computer program was used to examine the effect of physical damage, hybrid, and weather conditions on dry matter loss during drying of 22% m.c. (wet basis) shelled corn with air at ambient conditions. Simulations used official weather data for October and November of 1969, 1975, and 1977

for locations in southwest, central, and northeast Indiana. Multipliers corrected allowable storage time for differences in grain damage and hybrid resistance to storage mold. Regardless of location or physical damage level, dry matter losses (DMLs) of the hybrids resistant to mold growth were consistently 30 to 40% lower than DMLs for susceptible hybrids. When 45% of the kernels had damage to the pericarp or were broken, there was 2.0 to 2.3 times the DML in the top layer of corn as there was when 15% had damage. The effect of damage was slightly greater in hybrids susceptible to mold invasion. Hybrid storage mold resistance had approximately the same effect as changing the percentage of damaged kernels from 45% to 30%. Allowable storage time was influenced by both corn temperature and drying time. For the location-year combinations studied, average wet bulb depression during the drying period was a good indicator of time required to dry and average wet bulb temperature was a good indicator of potential for DML. These two factors can be used to interpret the influence of weather on differences in damage and hybrid resistance. Minimum deterioration of the top layer occurred when the average wet bulb temperature was relatively low and the average wet bulb depression was large. The increase in DML for a good year versus a bad year was equivalent to changing kernel damage from 30% to 45%. Transactions of the ASAE. July/Aug 1990. v. 33 (4). p. i291-i298. Includes references. (NAL Call No.: DNAL 290.9 AM32T).

1636

### Efficacy of selected herbicides as influenced by soil properties.

WETEE9. Blumhorst, M.R. Weber, J.B.; Swain, L.R. Champaign, Ill. : The Society. Weed technology : a journal of the Weed Science Society of America. Apr/June 1990. v. 4 (2). p. 279-283. Includes references. (NAL Call No.: DNAL SB610.W39).

1637

**Emergence of the western and northern corn rootworms (Coleoptera: Chrysomelidae) from four tillage systems.**  
JEENAI. Gray, M.E. Tollefson, J.J. College Park, Md. : Entomological Society of America. Emergence of the western corn rootworm (WCR), *Diabrotica virgifera virgifera* LeConte, and northern corn rootworm (NCR), *D. barberi* Smith and Lawrence, was evaluated in four tillage systems near Ames, Iowa, from 1983 through 1985. Linear regression equations ( $y = a + bx$ ) and coefficients of determination ( $R^2$ ) are presented that describe cumulative emergence ( $y$ ) (profit scale) on Julian date ( $x$ ) for both species in each tillage system. Initial emergence generally was delayed in conservation tillage treatments for the WCR. The rate of WCR emergence in these tillage systems was greater, however, than in more conventional practices. Because of increased rates of WCR emergence from conservation tillage practices, cumulative beetle emergence by mid-August through early

## (MATHEMATICS AND STATISTICS)

September is comparable among tillage treatments despite delayed emergence associated with conservation practices. Emergence of NCR was less affected by tillage. *Journal of economic entomology*. Oct 1988. v. 81 (5). p. 1398-1403. Includes references. (NAL Call No.: DNAL 421 J822).

1638

Experiments using a simulation model of the Banks grass mite (*Acari: Tetranychidae*) and the predatory mite *Neoseiulus fallacis* (*Acari: Phytoseiidae*) in a corn microenvironment. EVETEX. Berry, J.S. Holtzer, T.O.; Norman, J.M. Lanham, Md. : Entomological Society of America. The simulation model (MiteSim) of the mite predator-prey system consisting of Banks grass mite, *Oligonychus pratensis* (Banks), and the predatory mite *Neoseiulus fallacis* (Garman) was used to evaluate mite population dynamics in Nebraska corn fields in relation to microenvironmental variables. Simulation results demonstrated the importance of using humidity and temperature conditions at the leaf surface instead of weather station conditions to simulate the mite system on corn in Nebraska. Also, humidity (in addition to temperature) was determined to be critically important in the population dynamics of the two mites. The temperature and humidity at the leaf surface of moderately drought-stressed corn (compared with well-watered corn) resulted in higher simulated populations of Banks grass mite. Simulation studies also showed that colonization of a corn field by less than one adult female Banks grass mite per plant in June can result in mite densities sufficient to cause crop loss by August (Banks grass mite biotic potential without extrinsic mortality). *Environmental entomology*. Aug 1991. v. 20 (4). p. 1074-1078. Includes references. (NAL Call No.: DNAL QL461.E532).

1639

Factors affecting bioactivity of soil insecticides: relationships among uptake, desorption, and toxicity of carbofuran and terbufos. JEENAI. Felsot, A.S. Lew, A. Lanham, Md. : Entomological Society of America. Toxicities of insecticides applied to soil vary with soil type. The content of organic matter in soil seems to be most strongly associated with differences in toxicity. To test the hypothesis, that partitioning processes in soil influence toxicity by affecting the availability of the insecticides to the insects, we measured the uptake by southern corn rootworm, *Diabrotica undecimpunctata howardii* Barber, larvae of two concentrations of terbufos and carbofuran in four soil types. Desorption of the two insecticides from the soil into a calcium chloride solution also was determined. Concentration-response estimates for each insecticide were correlated with measurements of the uptake of the insecticides by larvae and the potential for desorption of the insecticide. Multiple regression analysis

indicated that organic carbon content of the soil accounted for the greatest proportion of variability in LC<sub>50</sub> and LC<sub>95</sub>. Uptake and desorption also were significantly correlated with organic carbon content. The data supported the role of partitioning in explaining toxicity of insecticides applied to soil. *Journal of economic entomology*. Apr 1989. v. 82 (2). p. 389-395. Includes references. (NAL Call No.: DNAL 421 J822).

1640

Forecasting *Hydraecia immanis* (Lepidoptera: Noctuidae) moth phenology based on light trap catches and degree-day accumulations. JEENAI. Levine, E. Lanham, Md. : Entomological Society of America. The temperature threshold and thermal requirements for total development (egg through 50% moth emergence) of *Hydraecia immanis* Guenée were determined under controlled conditions. Developmental rate was linearly related to temperature (12.8-23.9 degrees C). The threshold temperature, regression equation, coefficient of determination (r<sup>2</sup>), and degree-days (DD) for total development were 5.3 degrees C, y = 0.057X - 0.303, r<sup>2</sup> = 0.99, and 1,756.8, respectively. Seasonal flight of *H. immanis* was monitored with blacklight traps during 1982-1984 at Lanark, Ill., and cumulative emergence was related to degree-days. Over the 3-yr study, first capture of moths began when an average of 1,324.4 DD had accumulated; 50% moth capture coincided with an average of 1,762.0 DD. A logistic regression model gave projected degree-day requirements of 1,471.2 for 10% and 1,726.9 for 50% catch. Calendar date estimates were considerably less accurate than either cumulative degree-days or regression equation methods for predicting published 10 or 50% moth flight at two sites in Wisconsin. The regression model predicted 10% moth flight within 1 to 3 d, depending on site. Only 19 of the 222 moths captured during the 3-yr period were female, whereas 14 of 21 field-collected larvae reared to the adult stage were female. Seventeen of the 19 females captured in the 3-yr study were mated, and the reproductive status of these females was classified as ovipositional. *Journal of economic entomology*. Apr 1989. v. 82 (2). p. 433-438. Includes references. (NAL Call No.: DNAL 421 J822).

1641

Groundwater allocation in irrigated crop production. JPRAEN. Chanyalew, D. Featherstone, A.M.; Buller, O.H. Madison, Wis. : American Society of Agronomy. *Journal of production agriculture*. Jan/Mar 1989. v. 2 (1). p. 37-42. Includes references. (NAL Call No.: DNAL S539.5.J68).

## (MATHEMATICS AND STATISTICS)

1642

Influence of European corn borer (Lepidoptera: Pyralidae) feeding on various stages of field corn in Kansas.

JEENAI, Calvin, D.D. Knapp, M.C.; Xingquan, K.; Poston, F.L.; Welch, S.M. College Park, Md. : Entomological Society of America. Journal of economic entomology. Aug 1988. v. 81 (4). p. 1203-1208. Includes references. (NAL Call No.: DNAL 421 J822).

1643

Integrating economic analysis with biophysical simulation: appraising Blackland corn production.

TAEBA. Dillon, C.R. Mjelde, J.W.; McCarl, B.A.; Cothren, J.T.; Martin, J.R.; Rister, M.E.; Stockle, C. College Station, Tex. : The Station. B - Texas Agricultural Experiment Station. Jan 1990. (1654). 51 p. Includes references. (NAL Call No.: DNAL 100 T31S (1)).

1644

Joint risk preference-technology estimation with a primal system.

Love, H.A. Buccola, S.T. Ames, Iowa : American Agricultural Economics Association. Applied studies of the firm in a risky environment have concentrated either on the firm's technology or on its risk preferences. These models result in generally inconsistent and inefficient parameter estimates. A primal model is proposed which allows a firm's preferences and technology to be estimated jointly in the presence of risk. The model is applied to Iowa corn production and estimated technology parameters are compared with those from other approaches. Modest risk aversion leads to inelastic (even backbending) per-acre supplies and input demands. Yield heteroskedasticity in inputs leads to supply heteroskedasticity in prices, especially for risk-neutral firms. American journal of agricultural economics. Aug 1991. v. 73 (3). p. 765-774. Includes references. (NAL Call No.: DNAL 280.8 J822).

1645

Microlysimeter soil columns for evaluating pesticide movement through the root zone.

JEVQAA. Fermanich, K.J. Daniel, T.C.; Lowery, B. Madison, Wis. : American Society of Agronomy. Field approaches to studying pesticide movement are subject to numerous variables of the environment, many of which are difficult and expensive to monitor. This study describes the design, construction, operation, and performance of intact microlysimeter soil (Plainfield loamy sand-mixed, mesic, Typic Udipsamment) columns used to examine the mobility of two insecticides through soil from two tillage plots (conventional-moldboard plow and no-till tillage). Field leaching conditions were approximated by simulating a moisture and temperature regime characteristic of a natural

soil profile. Measured daily and seasonal temperature fluctuated according to a pattern characteristic of a field soil.

Evapotranspiration (ET) from the soil columns was 61% of the total water applied and was nearly equal to the ET measured (63%) from field lysimeters of this soil planted to corn (*Zea mays L.*). Variation in cumulative drainage was small, total drainage from all columns was within a range of 3.9 cm. There was no significant difference in the transport of bromide (conservative tracer) through columns from the two tillage plots. Bromide leachate loss was 62 and 63% of the amount applied for conventional-moldboard plow and no-till columns, respectively. Intact soil columns established in a microlysimeter fashion provided a means to compare the movement of agricultural chemicals under controlled conditions in the greenhouse that approximate conditions/processes in the field. Journal of environmental quality. Jan/Mar 1991. v. 20 (1). p. 189-195. Includes references. (NAL Call No.: DNAL QH540.J6).

1646

Modeling the effect of shattercane on corn growth and yield.

AAEPC. Retta, A. Vanderlip, R.L.; Moshier, L.J.; Machmes, K.; Higgins, R.A. St. Joseph, Mich. : The Society. Paper - American Society of Agricultural Engineers. Paper written for presentation at the 1989 International Summer Meeting American Society of Agricultural Engineering and the Canadian Society of Agricultural Engineering, June 25-28, 1989, Quebec Canada. Summer 1989. (89-4041). 8 p. Includes references. (NAL Call No.: DNAL 290.9 AM32P).

1647

Modeling the effects of the microsporidium, *Nosema pyrausta*, on the population dynamics of the insect, *Ostrinia nubilalis*.

JIVPA. Onstad, D.W. Maddox, J.V. Duluth, Minn. : Academic Press. Journal of invertebrate pathology. May 1989. v. 53 (3). p. 410-421. Includes references. (NAL Call No.: DNAL 421 J826).

1648

Plant variety protection, private funding, and public sector research priorities.

Knudson, M.K. Pray, C.E. Ames, Iowa : American Agricultural Economics Association. American journal of agricultural economics. Paper presented at AAEA Annual Meeting, August 4-7, 1991, Manhattan, Kansas. Discussions by: J.H. Reilly, p. 898-900; M.E. Walsh, p. 901-902; and J.F. Oehmke, p. 903-904. Aug 1991. v. 73 (3). p. 882-886. Includes references. (NAL Call No.: DNAL 280.8 J822).

## (MATHEMATICS AND STATISTICS)

1649

The potential economic impact of herbicide-resistant corn in the USA.  
JPRAEN. Tauer, L.W. Love, J. Madison, Wis. : American Society of Agronomy. Journal of production agriculture. July/Sept 1989. v. 2 (3). p. 202-207. Includes references. (NAL Call No.: DNAL S539.5.J68).

1650

Probabilistic cost effectiveness in agricultural nonpoint pollution control.  
McSweeney, W.T. Shortle, J.S. Experiment, Ga. : The Association. Conceptual weaknesses in the use of costs of average abatement as a measure of the cost effectiveness of agricultural nonpoint pollution control are examined. A probabilistic alternative is developed. The focus is on methods for evaluating whole-farm pollution control plans rather than individual practices. As a consequence, the analysis is presented in a chance-constrained activity analysis framework because activity analysis procedures are a practical and well developed device for screening farm plans. Reliability of control is shown to be as important as reduction targets in designing farm plans for pollution control. Furthermore, broad-axe prescriptions of technology in the form of Best Management Practices may perform poorly with respect to cost effectiveness. Southern journal of agricultural economics - Southern Agricultural Economics Association. July 1990. v. 22 (1). p. 95-104. Includes references. (NAL Call No.: DNAL HD101.S6).

1651

Program participation and acreage response functions for U.S. corn: a regional econometric analysis.  
Chembezi, D.M. Womack, A.W. East Lansing, Mich. : Michigan State University. Conventional methods in supply analysis have usually modeled program and non-program acreage response in a single aggregate equation. In the presence of government programs, such an approach is less preferred because it fails to distinguish the factors affecting producers' decisions to participate from the factors affecting their planting decisions. A more effective approach is to estimate producer participation response first and then relate this to program planted acreage. Nonprogram acreage response is estimated separately, and is inversely related to participant response. This article reports empirical estimates from two alternative procedures that directly address this concern. The analysis is based on regional time series data for the Cornbelt and Lake States and the Northern Plains. Review of agricultural economics. July 1991. v. 13 (2). p. 259-275. Includes references. (NAL Call No.: DNAL HD1773.A3N6).

1652

Relationship of plant phenology to corn yield loss resulting from western corn rootworm (Coleoptera: Chrysomelidae) larval injury, nitrogen deficiency, and high plant density.  
JEENAII. Spike, B.P. Tollefson, J.J. Lanham, Md. : Entomological Society of America. Relationships among stresses caused by nitrogen deficiency, high plant population levels, and western corn rootworm (WCR) (*Diabrotica virgifera virgifera* LeConte) injury and their effects on phenological development and grain yield of corn (*Zea mays* L.) were determined in a 2-yr field study. WCR infestation did not significantly affect silk development in 1984, although yields were 88.8 and 80.6% of those of the control at densities of 600 and 1,200 eggs per 30.5-cm row, respectively. Effects from root injury appeared to be compounded by moisture-stressed conditions in 1985, and asynchrony between tassel and silk development resulted in increased plant barrenness. Grain yields in 1985 were 80.2 and 55.6% of those of undamaged plants at the 600- and 1,200-egg infestation levels. Evidence from plant density by rootworm interaction on silking interval, barrenness, and yields suggests that the corn plant can tolerate a certain amount of root damage when plant densities are low. A significant nitrogen by rootworm interaction on grain yields provided evidence that root injury interferes with nitrogen uptake. The disruption of phenology of the injured corn plants appeared to be the result of decreased plant turgor resulting from WCR feeding. Journal of economic entomology. Feb 1989. v. 82 (1). p. 226-231. Includes references. (NAL Call No.: DNAL 421 J822).

1653

Relationship of root ratings, root size, and root regrowth to yield of corn injured by western corn rootworm (Coleoptera: Chrysomelidae).  
JEENAII. Spike, B.P. Tollefson, J.J. Lanham, Md. : Entomological Society of America. Root damage ratings are a major method of assessing larval injury to corn roots by corn rootworms. This 2-yr study was conducted to examine the relationships between root ratings, root size, root regrowth, and grain yield. Treatments included several nitrogen, plant density, and western corn rootworm infestation levels. Root ratings were not consistent predictors of yield over both years of this study. Yields of plants having root injury were highly variable when agronomic and environmental conditions were favorable for plant growth. Root biomass was a more consistent predictor of grain yield with R<sup>2</sup> of 0.52 and 0.61 in 1984 and 1985, respectively. Root growth (regrowth in infested plants) was quantified in 1985 by subtracting root weights in early July from average weights sampled after regrowth had occurred. During this time period, root growth of noninfested plants was not statistically different than regrowth of infested plants. The interaction between infestation and nitrogen was significant, which indicated that regrowth of damaged roots increased greatly with the

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application of nitrogen. Regrowth of injured roots also was enhanced in the moderate plant density (63,000 plants per ha) treatment. Grain yields were related to regrowth of injured plants ( $R^2$  of 0.65 and 0.60 at the moderate and high infestation levels, respectively). These results suggest that an index for regrowth should be used when relating root damage to grain yield. *Journal of economic entomology*. Dec 1989. v. 82 (6). p. 1760-1763. Includes references. (NAL Call No.: DNAL 421 J822).

1654

### Simulation model of the population dynamics of *Ostrinia nubilalis* (Lepidoptera: Pyralidae) in maize.

EVETEX. Onstad, D.W. Lanham, Md. : Entomological Society of America. A detailed mathematical model of *Ostrinia nubilalis* (Hubner) in maize, *Zea mays* L., was created for use in ecological studies. Validation results indicated that the model predicts long-term population dynamics and within-season survival relatively well. For other processes, validation results were mixed, with the best fits occurring when diapause induction was modeled accurately. The results demonstrated the importance of natural enemies, temperature, and photoperiod (latitude) to population dynamics. This simulation model is an adequate first step in the creation of a comprehensive explanatory model that can be used to guide experimentation and explore ecological principles. *Environmental entomology*. Dec 1988. v. 17 (6). p. 969-976. Includes references. (NAL Call No.: DNAL QL461.E532).

1655

### Soil erosion, intertemporal profit, and the soil conservation decision.

Pagoulatos, A. Debertin, D.L.; Sjarkowi, F. Experiment, Ga. : The Association. This study developed an intertemporal profit function to determine optimal conservation adoption strategies under alternative scenarios with respect to crop prices, relative yields, discount rates, and other assumptions. Special emphasis was placed on determining from the analysis when the switchover from conventional to soil-conserving practices should take place. Technological change was incorporated by allowing crop yields to vary over time. Our analysis thus provides a new, more precise measurement of the cumulative net benefit differential. The optimal period for switchover from conventional to soil-conserving practices was found to vary depending on the assumptions made about corn prices and discount rates. Empirical results were based on an erosion damage function (EDF) for Western Kentucky corn production. *Southern journal of agricultural economics - Southern Agricultural Economics Association*. Dec 1989. v. 21 (2). p. 55-62. Includes references. (NAL Call No.: DNAL HD101.S6).

1656

### Soybean yield responses and intraspecific competition from simulated seedcorn maggot injury.

AGJOAT. Higley, L.G. Pedigo, L.P. Madison, Wis. : American Society of Agronomy. The reproductive and competitive responses of plants to early season stresses are not well known. In field experiments from 1983 to 1986 we examined these effects for one system; simulated seedcorn maggot (SCM), *Delia platura* (Diptera: Anthomyiidae) injury to soybean, *Glycine max* (L.) Merr. Injury included different plant densities (simulating stand reductions) and different ratios of plumule-injured to uninjured plants (simulating different levels of plumule destruction). Our objectives were to describe (i) how simulated SCM injury affected total yield, yield components, and intraspecific competition between injured and uninjured plants, and (ii) to determine the value of the replacement series experimental design for examining intraspecific competition from injury. Plant density did not influence plot yields but did affect yield components of injured and uninjured plants. The proportion of injured to uninjured plants influenced plot yields in 1983 and 1984 but not in 1985 or 1986. Uninjured soybean were much stronger competitors than injured soybean. Yield reductions of injured plants were attributable to competition from uninjured plants. Specifically, competition seemed to increase shading and reduce assimilate availability of injured plants. The replacement series design was a powerful technique for describing intraspecific competition arising from insect injury. *Agronomy journal*. Jan/Feb 1991. v. 83 (1). p. 135-139. Includes references. (NAL Call No.: DNAL 4 AM34P).

1657

**Spatial and temporal dynamics of animals and the host-density threshold in Epizootiology.**  
JIVPA. Onstad, D.W. Maddox, J.V.; Cox, D.J.; Kornkven, E.A. Duluth, Minn. : Academic Press. *Journal of invertebrate pathology*. Jan 1990. v. 55 (1). p. 76-84. ill. Includes references. (NAL Call No.: DNAL 421 J826).

1658

### Spread of maize chlorotic dwarf virus in maize fields by its leafhopper vector, *Graminella nigrifrons*.

PHYTA. Madden, L.V. Knoke, J.K.; Louie, R. St. Paul, Minn. : American Phytopathological Society. Adult leafhoppers of *Graminella nigrifrons*, given a 2-day acquisition access period to maize chlorotic dwarf virus (MCDV), were released in the center of maize plots planted in early May (1985 and 1986) or in late June to early July (1984-1986). Disease incidence (y) was assessed at least twice after insect release and represented as the proportion of plants infected by MCDV in successive 80-cm wide annuli from the source.

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Disease gradients were best described by the log-logistic model, i.e., logit of  $y$  versus  $\ln(\text{distance})$  was a straight line. The model indicated that the rate of spread was proportional to  $y$ ,  $1 - y$ , and  $1/\text{distance}$ . The spread parameter ( $b$ ), a measure of the gradient steepness and slope of the linearized model, ranged from 1.3 for the early planting in 1985 to 2.0 for the late planting in 1984. In 1984 and the early plantings of 1985 and 1986, there was little change in  $b$  over time. In the late plantings, however,  $b$  increased (indicating steeper gradients) between 14 and 21 days after release. At approximately 21 days after release, the distance at which  $y$  declined to 0.10 (10%) ranged from 124 to 525 cm. The rates of increase in  $y$  over time for the entire plots and at selected distances from the release point were measured using the apparent infection rate ( $r$ ). There was no discernible effect of distance from the source on  $r$ . The  $r$  parameter consistently declined over time. Results indicate that MCDV spread can be substantial when viruliferous leafhoppers are introduced into a field of susceptible maize. *Phytopathology*. Mar 1990. v. 80 (3). p. 291-298. Includes references. (NAL Call No.: DNAL 464.8 P56).

1659

### Sprinkler irrigation management for corn--Southern Great Plains.

Howell, T.A. Copeland, K.S.; Schneider, A.D.; Dusek, D.A. Washington, D.C. : The Service. Reprints - U.S. Department of Agriculture, Agricultural Research Service. Literature review. Jan/Feb 1989. 159 . p. 147-155. Includes references. (NAL Call No.: DNAL aS21.A8U5/ARS).

1660

### Sprinkler irrigation management for corn--southern great plains.

Howell, T.A. Copeland, K.S.; Schneider, A.D.; Dusek, D.A. St. Joseph, Mich. : The Society. American Society of Agricultural Engineers (Microfiche collection). Paper presented at the 1988 Summer Meeting of the American Society of Agricultural Engineers. Available for purchase from: The American Society of Agricultural Engineers, Order Dept., 2950 Niles Road, St. Joseph, Michigan 49085. Telephone the Order Dept. at (616) 429-0300 for information and prices. 1988. (fiche no. 88-2098). 21 p. 111. Includes references. (NAL Call No.: DNAL FICHE S-72).

1661

### Suitability of corn growth models for incorporation of weed and insect stresses.

AGJOAT. Retta, A. Vanderlip, R.L.; Higgins, R.A.; Moshier, L.J.; Feyerherm, A.M. Madison, Wis. : American Society of Agronomy. Shattercane Sorghum bicolor (L.) Moench and second generation European corn borer (ECB)

*Dstrinia nubilalis* (Hubner) are pests that singly or in combination reduce corn (*Zea maize* L.) production in the northcentral regions of the USA. Shattercane reduces corn growth and yield because it competes effectively with corn for light and water. Second generation ECB larvae, in tunneling through the vascular system, apparently affect yield by disrupting water and photosynthate movements. Pest models may be linked to physiological models for assessing the effects of pest stresses on corn growth and yield. CERES-Maize and CORNF corn growth models were chosen to test accuracy and consistency in predicting corn growth and yield parameters. The objectives were to evaluate corn growth models to which pest models could be attached and to test the sensitivity of the selected model to variations in light and water. Simulated leaf area index; vegetative, grain, and total biomass; and yield components were compared to measured data. CERES-Maize modified for leaf growth and phenology computations (VD/SAT) gave more accurate predictions of date of silking (bias = 1 d) than CDRNF (bias = 6 d) or original version CERES-Maize (bias = -5 d). Accurate estimation of phenology is important because the severity of yield reduction from ECB infestation is dependent on the stage of growth. Sensitivity of VD/SAT to reductions in light and water inputs was tested by simulating combinations of light and water levels ranging from 50 to 100% of actual. A 50% reduction in light resulted in average reductions of 26% in yield, 16% in kernel weight, 16% in kernel number, and 20% in leaf area index. Similarly, a 50% reduction in precipitation resulted in average reductions of 47% in yield, 51% in kernel weight, 1% in kernel number, and 1% in leaf area index. The combination model showed adequate sensitivity to light and water, and thus could be modified to mimic weed competition. *Agronomy journal*. July/Aug 1991. v. 83 (4). p. 757-765. Includes references. (NAL Call No.: DNAL 4 AM34P).

1662

### Temperature-dependent model for predicting emergence of adult southwestern corn borer (Lepidoptera: Pyralidae) in Texas.

JEENAI. Knutson, A.E. Jackman, J.A.; Cronholm, G.B.; Ng, S.S.; Davis, F.M.; Morrison, W.P. Lanham, Md. : Entomological Society of America. A temperature-dependent model designed to predict emergence of first-generation adult southwestern corn borer, *Diatraea grandiosella* Dyar, was developed and validated. Thermal unit requirements were determined for larval, prepupal, and pupal development for nondiapausing southwestern corn borer at three constant temperatures. Data input to the model were average daily mean maximum and minimum temperatures and the age class (instar) distribution of field-collected larvae. Model predictions agreed closely with observed adult emergence during 4 yr of field validation. Fifty to 69% of the predicted dates were within +/- 2 d of the observed emergence date for 5, 25, and 50% adult emergence. Application of the developmental model to an integrated pest management program for corn is discussed. *Journal of economic entomology*. Aug 1989. v. 82

## (MATHEMATICS AND STATISTICS)

(4). p. 1230-1236. Includes references. (NAL Call No.: DNAL 421 J822).

1663

### Thermic properties of grains--production of heat and CO<sub>2</sub>.

Srour, S. New York, N.Y. : Lavoisier Pub., c1988. Preservation and storage of grains, seeds, and their by-products : cereals, oilseeds, pulses, and animal feed / edited by J.L. Multon ; preface by A.M. Reimbert ; translated from French by D. Marsh ; reread by A.J. Eydt. p. 189-202. Includes references. (NAL Call No.: DNAL SB190.C6513).

1664

### Transient water stress in a vegetation canopy: simulations and measurements.

RSEEA. Carlson, T.N. Belles, J.E.; Gillies, R.R. New York, N.Y. : Elsevier Science Publishing. Remote sensing of environment. Paper presented at the "Symposium on Remote Sensing for Agriculture," May 16-18, 1990, Beltsville, Maryland. Feb/Mar 1991. v. 35 (2/3). p. 175-186. Includes references. (NAL Call No.: DNAL Q184.R4).

1665

Uncertainty and split nitrogen application in corn production.

Feinerman, E. Choi, E.K.; Johnson, S.R. Ames, Iowa : American Agricultural Economics Association. The split application of nitrogen provides insurance against the risk that late spring application will be infeasible because of wet soil. Risk aversion and production uncertainty have little impact on total nitrogen available to the crop but do affect the split in application and the total nitrogen applied. A risk-averse farmer applies more (less) nitrogen prior to planting and total nitrogen than a risk-neutral farmer if nitrogen and water are substitutes (complements). For the case of substitutes, the nitrogen lost through leaching is the premium which the risk-averse farmer pays to insure a proper level of nitrogen. American journal of agricultural economics. Nov 1990. v. 72 (4). p. 975-984. Includes references. (NAL Call No.: DNAL 280.8 J822).

1666

### Use of spectral vegetation indices to infer leaf area, evapotranspiration and yield. II. Results.

AGJOAT. Wiegand, C.L. Richardson, A.J. Madison, Wis. : American Society of Agronomy. Better methods of interpreting spectral observations of crop canopies in terms of agronomic characteristics such as green leaf area index ( $L$ ) and aboveground dry phytomass ( $DM$ ), and for estimating economic yield ( $Y$ ) are needed. The

equations proposed were applied to single year experiments with *Triticum aestivum* L. and *Triticum durum* Desf., *Gossypium hirsutum* L., and *Zea mays* L. in order to illustrate and further test them. As predicted fractional photosynthetically active radiation absorption (FPAR) could be estimated from vegetation indices (VI) such as perpendicular vegetation index (PVI) and the normalized difference (ND) about as well as from  $L$ . Generally,  $L/VI$  and FPAR/ $L$ -verbalized as  $L$  as a function of VI, and FPAR as a function of  $L$ -were exponential relations whereas FPAR/VI were linear or nearly linear functions. The DM, Y, and the harvest index ( $Y/DM$ ) were linearly related to PVI averaged for several dates during late vegetative development for wheat and corn, indicating that relative yields for both crops had been set by that development stage. The functional relations  $L/VI$ , FPAR/ $L$ , FPAR/VI,  $Y/VI$ ,  $DM/VI$ , sigma APAR/sigma VI,  $DM/\sigma APAR$ ,  $Y/\sigma VI$  and  $(Y/DM)/VI$  where APAR is daily absorbed PAR (MJ m<sup>-2</sup> d<sup>-1</sup>) presented document that direct spectral observations and the equations incorporating them do provide additional analytical tools for interpreting crop development, growth, and yield. Agronomy journal. May/June 1990. v. 82 (3). p. 630-636. Includes references. (NAL Call No.: DNAL 4 AM34P).

1667

### Using upper-bound slope through origin to estimate genetic harvest index.

AGJOAT. Prihar, S.S. Stewart, B.A. Madison, Wis. : American Society of Agronomy. Harvest index (HI), the ratio of grain to aboveground dry matter, is reported to be a species-related parameter and is recommended for screening cultivars. But the fact that it is affected by environmental stress limits its use for intercrop or intercultivar comparisons. Fair comparisons should be based on estimated genetic HI for a given environment, but a procedure to determine the same is lacking. We propose that the slope of an upper-bound in the grain yield vs. dry matter plot passing through the origin approximates the genetic HI because the highest grain yields against given dry matter represent the least-stressed and/or stress-adapted plants and passage of the line through the origin is necessary to satisfy the definition of HI. This HI also provides a useful reference for interpreting agronomic data with respect to stress effects associated with management practices. The HIs of sorghum *Sorghum bicolor* (L.) Moench, corn (*Zea mays* L.), and wheat (*Triticum aestivum* L.) were estimated by the upper-bounds of grain yield (corrected to dry weight) vs. dry matter yield taken from existing reports in the literature. Harvest index of sorghum and irrigated corn ranged between narrow limits of 0.48 to 0.53 and 0.58 to 0.60, respectively. Harvest index of irrigated wheat ranged from 0.38 to 0.47. Stress effects on HI are illustrated in plots of published and unpublished (dry) grain yields vs. dry matter yields and reasons for the same are discussed. Agronomy journal. Nov/Dec 1990. v. 82 (6). p. 1160-1165. Includes references. (NAL Call No.: DNAL 4 AM34P).

(MATHEMATICS AND STATISTICS)

1668

DNAL 79.8 W41).

Weed management decisions in corn based on  
bioeconomic modeling.

WEESA6. Lybecker, D.W. Schweizer, E.E.; King,  
R.P. Champaign, Ill. : Weed Science Society of  
America. A fixed (conventional) weed management  
strategy in corn was compared to three other  
strategies (two mixed and one flexible) in  
terms of weed control, grain yield, gross  
margin (gross income minus herbicide treatment  
costs), and herbicide use under furrow  
irrigation for four consecutive years. The  
fixed strategy prespecified preplanting,  
preemergence, postemergence, and layby  
herbicides. The flexible strategy herbicide  
treatments were specified by a computer  
bioeconomic model. Model decisions were based  
on weed seed in soil before planting, weed  
densities after corn emergence, herbicide  
costs, expected corn grain yield and selling  
price, and other parameters. The two mixed  
strategies were a combination of fixed and  
flexible strategies and designated either  
specified soil-applied herbicides (mixed/soil),  
or no soil-applied herbicide (mixed/no soil);  
postemergence treatments were determined by the  
model. Average corn grain yield was 10 280 kg  
ha-1 and gross income was 920 \$ ha-1 and  
neither differed among strategies. Total weed  
density and gross margin were significantly  
higher for the mixed/no soil and flexible  
strategies compared to the mixed/soil and fixed  
strategies. Total weed density averaged 28 720,  
28 100, 10 910, and 680 plants ha-1 for the  
mixed/no soil, flexible, mixed/soil, and fixed  
strategies, respectively. Annual gross margins  
for the four strategies averaged 885, 875, 845,  
and 810 \$ ha-1, respectively. Herbicide use  
over the 4-yr period for these four strategies  
averaged 3.8, 5.3, 20.5, and 26.9 kg ha-1,  
respectively, and each value differed from the  
other. Thus, weeds can be managed in corn,  
gross margins increased, and herbicide use  
decreased by employing a bioeconomic weed-corn  
model to make weed management decisions. Weed  
science. Jan/Mar 1991. v. 39 (1). p. 124-129.  
Includes references. (NAL Call No.: DNAL 79.8  
W41).

1669

Wild proso millet (*Panicum miliaceum*)  
interference in corn (*Zea mays*).

WEESA6. Wilson, R.G. Westra, P. Champaign, Ill.  
: Weed Science Society of America. Effects of  
wild proso millet interference with irrigated  
corn were evaluated in Nebraska and Colorado  
over a 2-yr period. Corn yield reductions  
ranged from 13 to 22% from a wild proso millet  
density of 10 plants m-2. As density increased,  
corn yield reduction could be predicted with a  
rectangular hyperbola regression model. Ten  
wild proso millet plants m-2 growing with corn  
produced 4200 to 6200 seed m-2. Corn yields  
were reduced 10% at one location if wild proso  
millet removal was delayed 2 weeks after corn  
planting. If removal was further delayed until  
6 weeks after corn planting, corn yield  
reductions at the two locations ranged from 16  
to 28%. Weed science. Apr/June 1991. v. 39 (2).  
p. 217-220. Includes references. (NAL Call No.:

# DOCUMENTATION

1670

Bioenergetics of the larger grain borer,  
*Prostephanus truncatus* (Horn) (Coleoptera:  
Bostrichidae), feeding on corn.  
AESAAI. Demianyk, C.J. Sinha, R.N. College  
Park, Md. : The Society. Annals of the  
Entomological Society of America. May 1988. v.  
81 (3). p. 449-459. Includes references. (NAL  
Call No.: DNAL 420 EN82).

1671

Development of an electronic system for  
detecting *Heliothis* spp. moths (Lepidoptera:  
Noctuidae) and transferring incident  
information from the field to a computer.  
JEENAI. Hendricks, D.E. Lanham, Md. :  
Entomological Society of America. A  
remote-insect detection system was designed,  
constructed, and operated in typical southern  
Texas environments near fields of corn and  
cotton. The system electronically detected  
*Heliothis zea* (Boddie) and *Heliothis virescens*  
(F.) and automatically radio-telemetered event  
information to a programmed data processor  
(computer). Remote infrared moth detector units  
were installed in the field and baited with  
species-specific pheromone lures. A tone-coded  
radio frequency pulse was transmitted from the  
detector units when moths that responded to  
respective lures were detected. Numbers of  
moths detected were automatically collated by  
the computer each night at hourly intervals.  
The infrared detectors, associated control  
circuits, and radio transmitters were reliable  
in adverse weather conditions. The system was  
at least 92% accurate in counting the moths  
detected and was 100% accurate in reporting the  
detection of single moths as a first event each  
night. Detector-transmitter units within a  
field consumed a nominal 6 mW from a 6-V  
lantern battery that lasted about 11 mo.  
Journal of economic entomology. Apr 1989. v. 82  
(2). p. 675-684. Includes references. (NAL Call  
No.: DNAL 421 J822).

1672

Financial projections for a case Illinois grain  
farm under three tillage scenarios.  
Koenigstein, K.W. Hornbaker, R.H. Urbana, Ill.  
: The Service. Farm economics facts and  
opinions - University of Illinois, Department  
of Agricultural Economics, Cooperative  
Extension Service. Oct 1990. (90-18). 5 p. (NAL  
Call No.: DNAL 281.8 F2226).

1673

Guess who's coming to dinner?.  
OAGPA. Holland, C. Corvallis, Or. : The  
Station. Oregon's agricultural progress -  
Oregon Agricultural Experiment Station.  
Winter/Spring 1988. v. 34 (3/4). p. 10-13. ill.  
(NAL Call No.: DNAL 100 OR30R).

# HUMAN MEDICINE, HEALTH AND SAFETY

1674

## Levels of bacteria, fungi, and endotoxin in bulk and aerosolized corn silage.

APMBA. Dutkiewicz, J. Olenchock, S.A.; Sorenson, W.G.; Gerencser, V.F.; May, J.J.; Pratt, D.S.; Robinson, V.A. Washington, D.C. : American Society for Microbiology. Three samples of silage taken from the surface of a silo and from depths of 20 and 45 cm in the silo were studied for identification of the potential agents causing symptoms of organic dust toxic syndrome. The samples were examined by dilution plating before and after aerosolization in an acoustical dust generator. Aerosol samples were collected by liquid impinger and filter cassettes. The samples were examined for total aerobic bacteria, anaerobic bacteria, gram-negative bacteria, lactobacilli, listeriae, thermophilic actinomycetes, fungi, and endotoxin. Very high levels of total aerobic bacteria and fungi were found in the surface sample (up to  $10^9$  CFU/g in the bulk sample and up to  $10^9$  CFU/m<sup>3</sup> after aerosolization), whereas the corresponding values from the deepest site were 100 to 50,000 times lower. Aspergillus fumigatus predominated among the fungi, whereas Bacillus and gram-negative organisms (Pseudomonas, Alcaligenes, Citrobacter, and Klebsiella species) prevailed among bacteria. Thermophilic actinomycetes occurred in numbers up to  $10^7$  CFU/g in the bulk samples, whereas anaerobic bacteria, lactobacilli, and listeriae were only few or absent. The concentration of endotoxin was high in the surface sample (up to 211.4 Endotoxin Units/mg) and about 200-fold lower in the sample from the deepest site. The results show that contact with dust from the surface of silage carries the risk of exposure to high concentrations of microorganisms, of which A. fumigatus and endotoxin-producing bacteria are the most probable disease agents. Applied and environmental microbiology. May 1989. v. 55 (5). p. 1093-1099. Includes references. (NAL Call No.: DNAL 448.3 AP5).

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